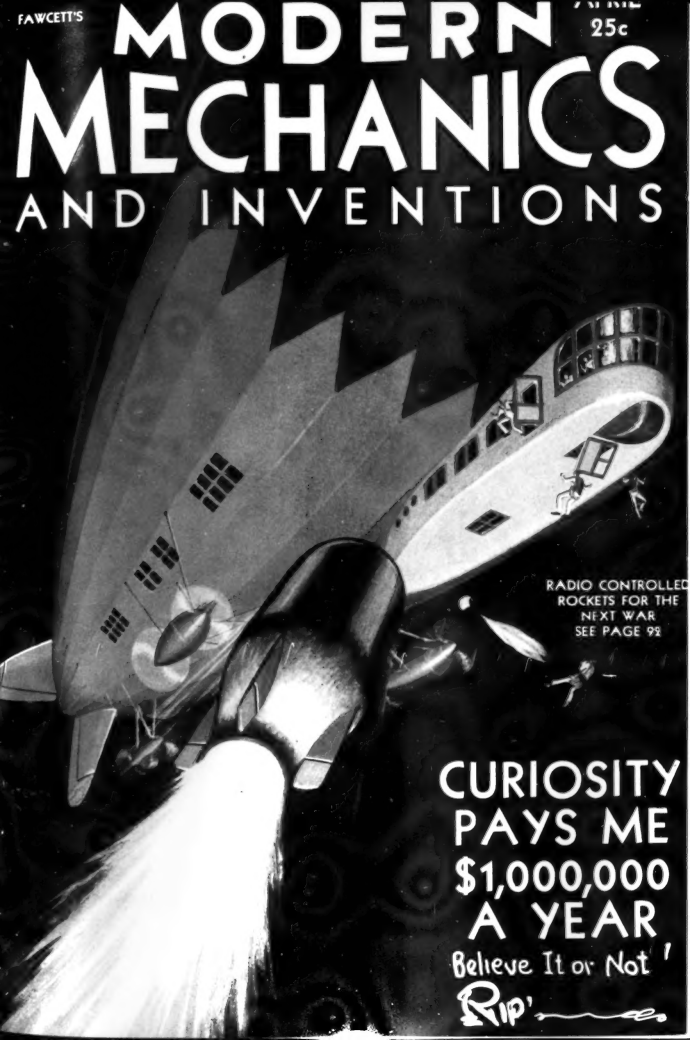
FAWCETT'S

MODERN MECHANICS AND INVENTIONS

25c



RADIO CONTROLLED ROCKETS FOR THE NEXT WAR
SEE PAGE 92

CURIOSITY PAYS ME $1,000,000 A YEAR

Believe It or Not!

Rip'

MAKE *up to* $30 DAILY *with this* MAGIC DISC

Clouds of Steam Pay You Immense PROFITS

What strange element is hidden in this curious disc which makes people gasp when they see it placed in a pan of water—a dish, a boiler, a bath tub—and in **split seconds** amazingly produce **Boiling, Sizzling, Steaming Hot Water** —2½ times quicker than by any other water heating method!

The Magic-like **LUX ELECTRIC WATER HEATER**. Made of pure, heavy aluminum with special patented, **new principle** Heating Element. Non-corrosive. Eight-foot solid rubber waterproof cord. For either AC or DC 110-volt current. **Fool-proof. Guaranteed.**

Not Much Larger Than This Picture

This astonishing performer is the new and remarkable LUX ELECTRIC WATER HEATER — one of the **fastest selling household utilities** ever devised.

Earn Rich Profits Daily

LUX has beaten all records for tremendous sales wherever introduced. It amazes all who see its breath-taking, dynamic action **prove** itself before their very eyes. Just plug in light socket anywhere—early morning, late at night—and **instantly** you have scalding, boiling hot water for any need. LUX coins Big Profits day after day for men and women agents—either full or spare time. It **sells, sells, sells**—to every home, office, store, business house, doctor, dentist, nurse, garage, filling station and hundreds of others. **Sold at a low price everyone can afford—operates hours for a fraction of a cent.**

You can comb the entire field for a faster seller—YOU WON'T FIND IT. LUX appeals to all by its practical economy and constant, everyday serviceability. You can sell **dozens** in a few hours and make

UP To $1.95 CASH in ADVANCE EVERY SALE—

No Investment—Amazing Free Offer

Swinton of Wisc. sold 18 LUX Heaters his first day. Smith of Penn. cleaned up $75.00 in only one week. Mrs. Misner of N. Y. earned over $30.00 in 8 hours! You, too, can make more money with LUX than you ever dreamed possible. We'll prove it.

Mail the coupon for liberal FREE OFFER and sales plan that starts you "cashing in" at once with **no investment.** DON'T DELAY.

Hot Water for the Bath—Instantly

LUX-VISEL COMPANY
46-B Jackson St., ELKHART, IND.

MAIL THIS AT ONCE

Lux-Visel Company,
46-B Jackson St., Elkhart, Ind.
Please rush Free details. Prove to me what I can do in my locality with LUX.

Name .....

Address .....

City ..... State

They're always looking for Bill when the crowd gathers

"WHERE in the deuce is Bill? It's like a funeral here. Gosh, if I could play an accordion like that boy, I'd charge you fellows for entertainment.

"Remember when he first came to college? What a 'wash out' we thought he was. He didn't go out for athletics or anything. But, Oh, Boy, when he took out that accordion of his and started to play! He sure can make it talk and he says he's only played it for a couple of months. Lucky guy, he may not be able to play basketball—but he goes every place with the team and gets his expenses paid, too. Did you hear him play between quarters at the last game?

"I wouldn't be at all surprised if he was voted the Most Popular Fellow in the class this year. He's a fine chap all right, but no one would ever have known it if it wasn't for that accordion of his."

Here's BILL NOW!

Nothing like an accordion to put you in the lime-light—in a class by yourself. The craze for this fascinating instrument is sweeping the country. Music dealers say they have never seen such enthusiasm for a musical instrument before. On the radio, on the stage, in the dance orchestra, the accordion is now all the rage. All the live-wire college boys and girls are playing it. Just the thing to make you popular at parties. It's a cinch to learn. No teacher needed. The Free Instruction Book tells you the simplified way. And it's easy to own one—Hohner Accordions, the world's best, are priced as low as $9.00.

Select the Instrument of Quality

Hohner Accordions are recognized by professional musicians as the finest instruments in their line in the world. Their tonal qualities, their accuracy and volume have given them a world-wide reputation, and they are guaranteed to give absolute satisfaction. You can make no mistake in buying a Hohner. Mail the coupon for FREE catalog giving full information about Hohner Accordions. Free Instruction Book with each instrument. Address: M. HOHNER, Inc., Dept. 204-D, 114 East 16th Street, New York, N. Y.

HOHNER
ACCORDIONS

M. HOHNER, Inc., 114 E. 16th St., Dept. 204-D, New York

Please send me your catalog of Hohner Accordions.

Name .....

Address .....

City ..... State .....

A FAWCETT MAGAZINE

Other Fawcett magazines are Screen Play, Startling Detective, Triple-X, Battle Stories, Mystic Magazine, Hollywood, and The Amateur Golfer and Sportsman.

Vol. V — No. 6

MODERN MECHANICS AND INVENTIONS

PRICE 25 CENTS

This magazine is not connected with or associated with any other magazine of a scientific or mechanical nature.

April, 1931

TABLE OF CONTENTS *for* APRIL

SPECIAL FEATURES

I Go 3 Miles for a Cent in My Car - - - - By C. L. Cummins 50
Believe It or Not - - - - - - By Robert L. Ripley 68
Next—100 Story Buildings - - - - - By Beverly Barnes 78
Measuring the Mountains of the Sea - - - By Capt. W. E. Parker 88
Airplane versus Automobile - - - - By Major H. H. Arnold 94
Winter Quarters With the Circus - - - - - By M. W. Meier 100
Mechanical Ingenuity Cheats Players at Carnival Games By Larry Innis 112
Outwitting the Plant Smugglers - - - By James Nevin Miller 146

GREAT "HOW-TO-BUILD" ARTICLES

A Ford-Powered 2-Seater Monoplane - - - By B. H. Pietenpol 116
Just for Fun - - - - - - - By Kenneth Murray 128
How to Build "Gannet" Part II - - - - By Charles H. Hall 135
Turn Out a Cigarette Stand on Your Lathe - By Dale Van Horn 152
Building a Chevrolet Racer - - - - - By Robert M. Roof 174

Interesting Shorter Features

Movies Shown on Two Screens at Same Time 58
Candid Camera Gets Surprise Photographs 64
Desert Animals "Shot" by Cactus Camera - 74
New Cars Seek Auto Speed Record - - 85
Radio Controlled Rockets for the Next War 92
Your Handwriting Analyzed Free - - 163
Huge Slide Hastens Death of Niagara Falls - 164
Unsung Heroes of the Lighthouse Service - 168
By James N. Miller
A Miniature Mansion at Kitchenette Cost - 185

For Craftsmen Young and Old

A Simple Radio Treasure Finder - - - 142
Combination Toy Bank and Block Puzzle - 149
A Garden Sparrow Trap - - - - 150
A Simple Two-Cylinder Electric Engine - 156
By Sewell V. Lehman
A Gas Furnace for Your Workshop - - 171
Wooden Monkey Holds a Light - - - 178
By Dale Van Horn
A Pumice Stone Buffer - - - - 182

Aviation

British Build Largest Land Plane - - - 67
Helio-Gyrocopter Designed for Vertical Flight 73
Army Air Service Revives Cloud Car - - 97
New German Developments in Airport Lighting 98
Single Spar Slotted Wings Next - - - 99
Circular Wing Airplane - - - - 140
Barrel Cam Engine Reveals Novel Features - 141

(Continued on page 6)

Published monthly by Fawcett Publications, Inc., at 501 7th Ave. So., Minneapolis, Minnesota. MODERN MECHANICS AND INVENTIONS entered as second class matter September 20th, 1928, at the Post Office, Minneapolis, Minnesota, under the act of March 3rd, 1879. W. H. Fawcett, Publisher; Roscoe Fawcett, General Manager; Jack Smalley, Managing Editor. ©Copyright 1930. Advertising Manager: Chicago office, 35 East Wacker Drive (Phone State 2955); New York office, 53 Vanderbilt Avenue, Room 606 (Phone Vanderbilt 8490). All manuscripts should be addressed to our editorial office at 529 So. 7th Street, Minneapolis, Minn. Manuscripts will not be returned unless accompanied by return postage. Advertising forms close on the 20th of the third preceding month. Price 25 cents a copy; $2.50 a year in the United States and possessions. Other Postal Unions, $3.00 per year. Printed in U. S. A.

National Salesmen's Training Assn., Dept. D-703, N. S. T. A. Bldg., Chicago, Ill.

Without cost or obligation you may send me your free book, "The Key to Master Salesmanship."

Name .....

Address .....

City ..... State .....

Age ..... Occupation .....

They Laughed When I Mailed This Coupon

..But It Brought Me The Book That Showed Me How to Make $10,000 a Year!

As I walked up to the mail box, Joe nudged Ed and winked broadly for my benefit.

"Sh!" he hissed in a loud stage-whisper. "This is going to be the big turning point in Frank Parker's life! He's writing for a book that tells how to get into salesmanship. Pretty soon he'll be earning so much that he'll make the rest of us look like pikers!"

Ed snickered.

"Won't it be grand!" he grinned. "Now he can quit punching time-clocks and eating 40-cent lunches." He raised his voice. "Drop me a postal sometime when you get out into big business and start making $10,000 a year, will you, Frank?"

They both laughed uproariously. And probably it **did** seem like a joke to them that a $30 a week clerk would have the nerve to think he could ever get anywhere or make real money without some special "gift" or "pull."

But they laughed too soon. Just yesterday I sat down and wrote to Ed who is still at the shop, dragging along at the same old job.

"Dear Ed"—I wrote. "You asked me to send you a card when I got into big business and started making $10,000 a year.' Well, here's your card. Yesterday I was promoted to the job of assistant Sales Manager of the Western Metal Works, at a salary that goes with it. I'll loan you my copy of that book on salesmanship you used to think was such a joke."

Only a book! Just seven ounces of paper and printers' ink—but it contains one of the most vivid and inspiring messages that any ambitious man can read. It reveals the real truth about the art of selling, explains the science of selling in simple terms, and tells exactly how the great sales records of nationally-known star salesmen are achieved. And not only that—it outlines a simple plan that will enable almost any man to master scientific salesmanship without spending a moment on the road—without losing a day or a dollar from his present position.

A Few Weeks—Then Bigger Pay

Reason it out for yourself. Salesmanship offers bigger returns and delivers them quicker than any other line of work under the sun. But many people have subscribed to the foolish notion that a man has to be "born" with some sort of "gift" for salesmanship. Nothing could be farther from the truth. Just like any other profession, salesmanship is governed by certain fundamental rules and laws—laws which you can master as easily as you learned the alphabet.

Right now an unusual demand for salesmen is being reported. City and traveling sales positions are open in nearly every line all over the country. Last year requests for over 50,000 trained men were received. This employment service is free to both employers and employees, and thousands have secured excellent positions this way.

Free to Every Man

See for yourself why "The Key to Master Salesmanship" has been the deciding factor in the careers of so many men who are now making $10,000 a year. See how Mark Barichievich of San Francisco, Calif., for example, jumped from $8 a week as dishwasher to $150 as salesman. Find out how F. B. Englehardt of Chattanooga doubled his pay and commenced earning $7,000. Learn for yourself the REAL truth about the art of selling! If we were asking $2 or $3 a copy you might hesitate. But the book is now FREE. You do not risk one penny nor incur the slightest obligation. And since it may alter your entire future, it certainly is worth your time to fill out and clip the coupon at the top of this page. Why not do it now!

National Salesmen's Training Association
Dept. D-703
N.S.T.A. Bldg. Chicago, Ill.

Where Shall We Send Your Copy—FREE?

MAIL COUPON ABOVE TODAY

TABLE OF CONTENTS — Continued From Page 4

For the Motorist

Elastic Gate Stops Speeding Cars - - 56
Folding Auto Picnic Table - - - - 127
Motorcycle Racer Uses Iron Streamlining - 127
Gas Station Shaped Like a Wigwam - - 141
Reconditioning the Cylinder Bores - - 159
By Ray F. Kuns
An Auto Engine for the Motorboat - - 160
How Castings Are Made - - - 161
An Efficient Sprocket Puller - - 161
Care of Spring Shackle Bolts - - 161
Hints on Care of Motorcycle Chains - 162
Timing Valves on a Harley Twin - - 162
Two Drivers Needed for British Lorry - 183
Circuit Breaker Guards Wiring - - - 183

The Shop Mail Box Will Be Found This Month on Page 24

To Interest the Radio Fan

Clock Will Switch Radio On and Off - - 73
Nerve Impulses Heard on Speaker - - 126
Loud Speaker Heard 12 Miles - - - 126
Plan Radio Burglar Alarm - - - - 140
A Simple Mike for Radio Fans - - - 144
By L. B. Robbins
Remote Control Hookup for Your Receiver 145
Modulation Transformer for Voice Transmission - - - - - 145
Short Wave Beam Transmitter - - - 155
Radio Needle Removes Moles - - - 155
Egyptian King Talks From Desert - - 166

Handikinks

Dropper Rubber Makes Tripod Tip - - 63
Drink Mixer From Old Auto Horn - - 76
Auto Fenders Make Bridge Guard - - 76
Sun's Rays Focused for Soldering - - 86
Sign Letters From News Headlines - - 106
Handy Door Stop - - - - - - 106
Heating Unit Defrosts Frigidaire - - 106
Shield Wiper Animates Window Display - 106
Ideas for the Auto Mechanic - - - 107
Stunts for the Handy Man - - - - 108
Workshop Ideas to Save Labor - - - 109
Easily Made Prop for Model Planes - - 110
Kite Line Reel - - - - - - - 110
A Simple Window Flash Sign - - - 111
Handy Method for Starting a Siphon - - 111
New Aids for the Tree Surgeon - - - 134
Auto Wheel Makes Curb Sign Base - - 166
Baby Bottles Feed Young Porkers - - 167
Simple Mexican Tanning Process - - 167

New Mechanical Inventions

Cigarette Lighter Built in Cane - - - 56
Grass Clipper Eliminates Stooping - - 56
Shipwreck Suit Keeps Victims Afloat - - 57
Shotgun Has Superposed Barrels - - 57
Rubber Tired Train Wheels - - - 57
Latest Aids for the Housewife - - - 62
Eternal Match Lights 600 Times - - - 63
Announcer for Trolleys Shows Streets - - 66
Stamp Printer for Private Firms - - - 66
New Brush Cleans Tongue - - - - 66
Package Keeps Absorbent Cotton Clean - 73
Gas Mask Permits Talking Over Phone - 77
Holder Ejects Cigarette Stubs - - - 87
Inboard Motor—Outboard Advantages - 105
Compressed Air Rejuvenates Soil - - 115
Fan Heater Warms or Cools Rooms - - 126
Machine Paints Golf Balls - - - 133
Flexible Neck for Garden Hose - - - 133
Device Measures Golf Drive - - - 139
Guard Prevents Opening Door from Outside 140
Telephone Mike Shuts Out Noise - - 141
Pistol Takes Sting Out of "Stick 'em Up" - 154
Ultra-Violet Rays Cure Pyorrhea - - 158
Neon Tube Chandeliers - - - - 176
Latest Electrical Inventions - - - 180

Interesting Items

Talkies to Entertain Train Passengers - - 55
Man Frozen in Ice for Thirty Minutes - 63
Canoe Goes 6½ Miles on Half Pint of Gas - 77
Compact Talkie Projector - - - - 86
Sportsman's Headnet Has Window - - 86
Chicago to Have Subway - - - - 87
First Indoor Football Game - - - 133
Rays Identify Old Painting - - - 133
Telescope Designed for Astral Photos - - 134

Edited by Experts

Listed here are the members of the Modern Mechanics Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers if stamped envelope is sent. Address them in care of this magazine, 529 S. 7th St., Minneapolis, Minn.

Donald G. Cooley
Chief of Staff

Major H. H. Arnold
Former Assistant Chief, U. S. Air Service

Pilot Gene Shank
Famous Aviator. Holder of Light Plane Endurance Flight Record

S. S. Rabl
Seaplane Designer and Naval Architect

A. Neely Hall
Author of "The Boy Craftsman," etc.

L. B. Robbins
Nationally Known Radio Expert

Ray F. Kuns
Principal, Cincinnati Automotive Trade School

Ivan Driggs
Noted Light Airplane Designer

Philip L. Rhodes
Naval Architect

Charles Hall
Former Editor of "Motor Boat"

Jay Earle Miller
Associate Editor and Chicago Correspondent

Bob Gordon

J. Russell Dye
Associate Editors

Inventor Produces Mysterious "Gas Bug"

That Will Save Gasoline

And Does 44 Other Amazing Things for Your Car

Here's a creation so utterly amazing in its action and results that it sounds almost like fiction. Yet it exists as a scientific fact—already tested by engineering authorities and on thousands of cars. It has been called "the strangest acting auto discovery under the sun," for it puzzles even shrewd minds. A mysterious discovery called "Gas Bug" —an uncanny "miracle" fluid that "crawls" and "climbs" as though filled with invisible life. Not a gasoline dope, carburetor device, electrical apparatus or other "contraption." No wonder agents are offered such big money making possibilities thru our plan of giving car owners Free Sample Demonstrations that do a vital engine job absolutely Free for owners—a job any mechanic would charge up to $10 or $12 to do.

In 3 Minutes

More Power—Speed—Pep

The 4 vital engine improvements that motordom has always striven for may be actually realized—increased gas mileage, reduction of the many engine evils that cost motorists millions, increased engine efficiency and many more miles of engine service. Saves money in gas, engine repairs, upkeep, wear and tear, valve grinding, carbon removing and many other ways. In 3 minutes you see amazing results—more power, more speed, more pep, smoother running engine. Loosens carbon. Valves operate snappier, faster, more accurately. Winter starting is easier. Missing, bucking, carbon knocks and spark plug troubles diminish. *If "Gas Bug" does not save enough gasoline to pay for itself many times—and do every one of the other 44 amazing things we claim—it will cost you nothing.* You be the judge.

NO CANVASSING

For Prospects

This queer discovery has proved so sensational in results and offers agents such big, quick money possibilities that no one less than the United States Motor Industries itself has taken it over and backs it with its own warrantees. Now, at last, the dream of nearly every agent has come true! A plan to make big money quick without personal "cold turkey" canvassing for prospects—yet, without even leaving your house. Stay at home and let the mails get the prospects for you. The most liberal plan we have heard of in years. We actually start you in a "Mail Order Business" of your own, at home, in full or spare time—on our warrantee given to protect you against money loss. You mail out free sample demonstration offers to motorists in your territory. Then watch your profits begin to roll in—up to $35 a day right from the start. We furnish you with these samples, powerful Circulars, return Post Cards with your name imprinted, Envelopes, Order Blanks—all the mail order literature needed to start this sensational plan—all without extra charge to you. So wonderful are the results of "Gas Bug" that we make it possible for agents to place it with motorists on 30 days' trial without risk to them. No number "Gas Bug" offers agents such a big-money opportunity.

Now Make Up To $35 a Day Without Leaving Your House For Prospects. New Plan puts You in a Mail Order Business of Your Own at Home.

Cash Pay

FOR MERELY DEMONSTRATING

Every car, truck and tractor owner in the country needs this amazing discovery so quick that we do the unheard-of to get you started at once. On another daring startling offer we actually pay you cash for merely demonstrating and giving away the samples to motorists free that do a vital engine job worth up to $10 or $12, FREE. No need to make sales to get this pay. But that is not all we do—we even pay you an extra cash forfeit if you don't satisfy yourself that "Gas Bug" offers you up to $35 a day.

$100 REWARD

We do as we promise! We will pay $100.00 cash reward to any worthy charity if anyone can show that we do not fulfill every offer we make to our agents.

SAMPLE OFFER

So that you can test the outstanding merits of this amazing discovery and to start you quick as our big money making agent, we will send you our generous introductory offer of a complete "Gas Bug" outfit for your own car. Just rush coupon. Send no money. Nothing will be sent C. O. D.

$1.00 Cash Bonus for Testing It

If "Gas Bug" doesn't do everything we claim, we will actually pay you a cash bonus for trying it. We expect this sensational announcement to bring thousands of applications for these big money openings. So rush coupon. United States Motor Industries, Inc., 311 North Desplaines St., Dept. 154, Chicago, Illinois.

United States Motor Industries, Inc.,
Accessory Division,
311 North Desplaines St., Dept. 154, Chicago, Illinois.

Without cost or obligation to me, rush generous introductory sample offer; offer of $1.00 Cash Bonus for testing it, plan that lets me start in a "Mail Order Business" of my own at home. Wirrantee of cash pay for merely demonstrating, and Details of Cash Bonus If your plan doesn't show me $35 a day possibilities. This is not an order. Send nothing C. O. D.

Name .....

Address .....

City ..... State .....

RADIO NEEDS TRAINED MEN
Let Us Train You at Home for a Big-Pay Job

GET into the rich field of Radio via the Radio Training Association. Radio manufacturers, distributors, dealers are all eager to employ our members because we train them right, and qualify them for the positions that require better trained men.

So great is this demand from Radio employers that positions offering good pay and real opportunity are going begging. If you want to cash in on Radio quick, earn $3.00 an hour and up spare time, $40 to $100 a week full time, prepare for a $10,000, $15,000, $25,000 a year Radio position, investigate the R. T. A. now.

Special Attention to Radio Service Work

Thousands of trained Radio Service Men are needed now to service the new all-electric sets. Pay is liberal, promotions rapid. The experience you receive fits you for the biggest jobs in Radio. The R. T. A. has arranged its course to enable you to cash in on this work within 30 days!

Would you like to work "behind the scenes" at Hollywood, or for a talking picture manufacturer? R.T.A. training qualifies you for this work. Television, too, is included in the training. When television begins to sweep over the country, R.T.A. men will be ready to cash in on the big pay jobs that will be created.

Expert Supervision Lifelong Consultation Service

As a member of the Association you will receive personal instruction from skilled Radio Engineers. Under their friendly guidance every phase of Radio will become an open book to you. And after you graduate the R.T.A. Advisory Board will give you personal advice on any problems which arise in your work. This Board is made up of big men in the industry who are helping constantly to push R.T.A. men to the top.

Because R.T.A. training is complete, up-to-date, practical, it has won the admiration of the Radio industry. That's why our members are in such demand—why you will find enrolling in R.T.A. the quickest, most profitable route to Radio.

Mail Coupon for *No-Cost* Training Offer

Memberships that need not—should not—cost you a cent are available right now. The minute it takes to fill out coupon at right for details can result in your doubling and trebling your income in a few months from now. If you are ambitious, really want to get somewhere in life, you owe it to yourself to investigate. Learn what the R.T.A. has done for thousands—and can do for you. Stop wishing and start *actually doing something* about earning more money. Fill out the coupon and mail today.

Radio Training Association of America
Dept. MM-4, 4513 Ravenswood Ave., Chicago, Ill.

Fill Out and Mail Today!

RADIO TRAINING ASSOCIATION OF AMERICA
Dept. MM-4, 4513 Ravenswood Ave., Chicago, Ill.

Gentlemen: Send me details of your No-Cost Training Offer and information on how to make real money in radio *quick*.

Name _____

Address _____

City _____ *State* _____

ARE YOU TIRED OF THE SAME OLD JOB?

HAVE YOU gotten to the place that you dread to go to the office or shop? Are you tired of doing the same old things, week after week, in the same old way? And have you given up hope of ever finding more money in your pay envelope?

If you're tired of your job, look out! The most likely reason you are at a standstill is because you lack the *training* to go ahead. Modern business is looking for men to promote!

All over the world, thousands of men have earned the right to better jobs—and more pay—by securing the training they needed from the International Correspondence Schools at Scranton. They changed the whole course of their lives by marking and mailing a coupon! Col. Edward V. Rickenbacker, S. E. Coneybeare, R. J. Wensley, E. E. Whitney—national leaders—were inspired and helped by I. C. S. The same opportunity is yours. Will you accept it? Or will you stay chained to that tiresome old job? What the future holds for you depends on what you do *now!*

Decide today—mark and mail the coupon.

INTERNATIONAL CORRESPONDENCE SCHOOLS

INTERNATIONAL CORRESPONDENCE SCHOOLS, *"The Universal University,"* **Box 2324-J, Scranton, Penna.**
Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject *before* which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

- ☐ Architect
- ☐ Architectural Draftsman
- ☐ Building Estimating
- ☐ Wood Millworking
- ☐ Contractor and Builder
- ☐ Architectural Draftsman
- ☐ Structural Engineer
- ☐ Electric Wiring
- ☐ Electrical Engineer
- ☐ Electric Lighting
- ☐ Welding, Electric and Gas
- ☐ Reading Shop Blueprints
- ☐ Telegraph Engineer
- ☐ Telephone Work
- ☐ Mechanical Engineer
- ☐ Mechanical Draftsman
- ☐ Machinist
- ☐ Toolmaker
- ☐ Patternmaker
- ☐ Pipefitter ☐ Tinsmith
- ☐ Bridge Engineer
- ☐ Bridge and Building Foreman
- ☐ Gas Engines
- ☐ Diesel Engines
- ☐ Aviation Engines
- ☐ Automobile Mechanic
- ☐ Plumbing
- ☐ Steam Fitting
- ☐ Heating ☐ Ventilation
- ☐ Sheet Metal Worker
- ☐ Steam Engineer
- ☐ Steam Electric Engineer
- ☐ Civil Engineer
- ☐ Surveying and Mapping
- ☐ Refrigeration
- ☐ R. R. Section Foreman
- ☐ R. R. Bridge and Building Foreman
- ☐ Air Brakes ☐ Train Operation
- ☐ Highway Engineering
- ☐ Chemistry ☐ Pharmacy
- ☐ Coal Mining Engineer
- ☐ Navigation ☐ Boilermaker
- ☐ Textile Overseer or Supt.
- ☐ Cotton Manufacturing
- ☐ Woolen Manufacturing
- ☐ Agriculture ☐ Fruit Growing
- ☐ Poultry Farming ☐ Radio
- ☐ Marine Engineer

BUSINESS TRAINING COURSES

- ☐ Business Management
- ☐ Office Management
- ☐ Industrial Management
- ☐ Personnel Management
- ☐ Traffic Management
- ☐ Accountancy
- ☐ Cost Accountant
- ☐ C. P. Accountant
- ☐ Bookkeeping
- ☐ Secretarial Work
- ☐ Spanish ☐ French
- ☐ Salesmanship ☐ Advertising
- ☐ Business Correspondence
- ☐ Lettering Show Cards ☐ Signs
- ☐ Stenography and Typing
- ☐ Complete Commercial
- ☐ Civil Service ☐ Mail Carrier
- ☐ Railway Mail Clerk
- ☐ Grade School Subjects
- ☐ High School Subjects
- ☐ College Preparatory
- ☐ Illustrating
- ☐ Cartooning
- ☐ Lumber Dealer

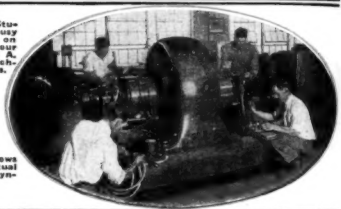
Name.....*Age*.....*Address*.....

City.....*State*.....*Occupation*.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

LEARN Without

Coyne Students busy at work on one of our modern A. C. switchboards.



The photo to the right shows several students getting actual experience on a large synchronous converter.

Here you see an Instructor explaining the operation of a modern airplane engine.

A general view of our great Alternating Current Department. These fellows are learning by actual, practical work.

These students are getting actual experience in armature winding and repair.

MAIL COUPON ON OPPOSITE PAGE

ELECTRICITY
Lessons In 90 Days

By Actual Work In the GREAT COYNE SHOPS

Dissatisfied with your present job? Not making enough money? Then come to Coyne in Chicago and learn Electricity in 90 days—NOT BY CORRESPONDENCE, but by actual electrical work—on huge motors and generators, power plants, substations, switchboards, auto and airplane engines, etc. You don't need advanced education or previous experience. I don't care if you are 16 years old or 46. It makes no difference! **I'll prepare you for a good-paying Electrical Job in 90 days!**

Learn to Earn $60 to $200 a Week

Good jobs are open paying $60 a week and up—in Power Plant work, Armature Winding, Auto Ignition, House Wiring, Radio Service, Refrigeration, Welding, Aviation Electricity, etc. **You can prepare for one of these fascinating jobs in 90 days!** Coyne has been training ambitious fellows like you since 1899. **Let Coyne train you for a Big Pay Electrical Job!**

FREE EMPLOYMENT SERVICE
Earn As You Learn

Don't worry about a job! Coyne Training settles the job question for life. You get **free** lifetime employment service. **And if you need part-time work while at school to help pay expenses, we'll gladly help you get it.** Coyne has been placing men in good electrical jobs for over 30 years!

GET THE FACTS!

Mail coupon for a **free** copy of my Big Electrical Book, telling all about jobs, salaries, opportunities. **Get the proof!** Mailing coupon does not obligate you in any way. **So fill it in and mail it to me today.** It costs **nothing** to investigate! **Just mail the coupon.**

Coyne Electrical School
500 S. Paulina Street
Dept. 41-53 CHICAGO, ILL.

FOR FREE BOOK

$75 a Week

"I am now in business for myself, averaging over $75 a week. I owe it all to my Coyne Training."
GORDON SMITH, *New York*

$8,000 a Year

"The first of the year I am accepting position as Chief Electrician at $8,000 a year —thanks to Coyne."
S. ZURAWSKI, *Michigan*

$60 to $200 a Week

"Since starting my own electrical business I have averaged $60 to $200 a week. I give Coyne credit for it all."
JOSEPH HARTLEY, *West Virginia*

$300 a Month

"I am now Chief Engineer, drawing $300 a month."
ELMER BASS, *Texas*

$85 a Week

"Before going to Coyne I made $30 a month. Now I am Service Station Manager, making $85 a week."
GEO. SCOGGS, *Nebraska*

MAIL TODAY!

H. C. LEWIS, President,
COYNE ELECTRICAL SCHOOL
500 S. Paulina St., Dept. 41-53, CHICAGO

Gentlemen: Please send me your big Free Electrical Book with 151 illustrations. This does not obligate me.

Name.....

Address.....

City.....State.....

General view of one section of our Service Department, showing students doing actual work on various Radio Receivers

LEARN RADIO--TELEVISION

Not By Books or Correspondence—By

Don't spend your life slaving away in some dull, hopeless job! Don't be satisfied to work for a mere $20 or $30 a week. Let me show you how to make REAL MONEY in RADIO—the Fastest-Growing, Biggest MONEY-MAKING GAME ON EARTH!

Thousands of Jobs Open

Paying $60, $70 to $200 a Week

Jobs as Designer, Inspector and Tester paying $3,000 to $10,000 a year—as Radio Salesman and in Service and Installation Work, at $45 to $100 a week—as Operator or Manager of a Broadcasting Station at $1,800 to $5,000 a year—as Wireless Operator on a Ship or Airplane, as a Talking Picture or Sound Expert—THOUSANDS of JOBS PAYING $60, $70 and on up to $200 A WEEK!

No Books — No Lessons

All Practical Work

Coyne is NOT a Correspondence School. We don't attempt to teach you from books or lessons. We train you on the finest outlay of Radio, Television and Sound equipment in any school—on scores of modern Radio Receivers, huge Broadcasting equipment, the very latest Television apparatus, Talking Picture and Sound Reproduction equipment, Code Practice equipment, etc. You don't need advanced education or previous experience. We give you—**right here in the Coyne Shops**—all the actual practice and experience you'll need. And because we cut out all useless theory, you graduate as a Practical Radio Man **in 10 weeks' time.**

Television *is Now Here!*

And Television is already here! Soon there'll be a demand for THOUSANDS of TELEVISION EXPERTS! The man who learns Television NOW

Instructor explaining principles and operation of a Talking Picture Machine

MAIL COUPON ON OPPOSITE PAGE

Students operating our modern Broadcasting equipment. In the rear you can see our Sound Proof Studio Room

TALKING PICTURES in 10 WEEKS

Actual Work ... in the Great Shops of Coyne

can make a FORTUNE in this great new field. Get in on the ground floor of this amazing new Radio development! Come to COYNE and learn Television on the very latest Television equipment.

Talking Pictures
A Great Field

Talking Pictures and Public Address Systems offer thousands of golden opportunities to the Trained Radio Man. Here is a great new field of Radio work that has just started to grow! Prepare NOW for these marvelous opportunities! Learn Radio Sound work at Coyne on actual Talking Picture and Sound Reproduction equipment.

EARN AS YOU LEARN

Don't worry about a job! **Coyne Training settles the Job question for life.** We often have more calls for Coyne Graduates than we can supply. **You Get Free Employment Service For Life.** And don't let lack of money stop you. If you need part-time work while at school to help pay living expenses, we will gladly help you get it. Many of our students pay nearly all of their expenses that way.

~~Coupon at 25 Years Old~~

Coyne Training is tested, **proven beyond all doubt.** You can find out everything **absolutely free.** How you can get a good Radio job or how you can go into business for yourself and earn from $3,000 to $15,000 a year. It costs **nothing** to investigate! Just **mail the coupon for your copy of my big Free book!**

Students operating and adjusting our modern Television Transmitting equipment

FOR BIG FREE BOOK

H. C. Lewis, Pres. **RADIO DIVISION** Founded 1899

COYNE ELECTRICAL SCHOOL
Dept. 41-1H
500 S. Paulina Street CHICAGO, ILL.

H. C. LEWIS, President
Radio Division, Coyne Electrical School
500 S. Paulina St., Dept. 41-1H, Chicago, Ill.
Send me your Big Free Radio Book and all details of your Special Introductory Offer. This does not obligate me in any way.

Name.....

Address.....

City.....*State*.....

RADIO

Lesson and Job Ticket . . . Actually FREE!

Mightiest in Opportunities

Did you read about the $500,000,000 "radio center" Rockefeller is building in New York? Do you realize that the home radio set business has hit the billion-dollar mark in 1930? Do you see right in your home town how every movie theatre has installed "talkie" equipment? Auto-radios—pictures by wireless—commercial wireless—the giant networks of broadcasting stations with their high-priced technical staffs—and soon, greatest of all—TELEVISION!

While you sit and read this—while you listen to your own radio—imagine the great army of experts and engineers, already employed to handle these great enterprises—and think of how many more *trained* men will be needed in the tremendous expansion programs of the near future.

Investigate RADIO—get the *facts*—let us show you how you can increase your earnings—advance in position—get a job that's more interesting—and insure your future. Coupon brings everything—mail it today.

American School

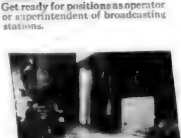
Chartered NOT FOR PROFIT

Like the best resident schools and universities, the American School is an *educational institution*, and has never paid dividends or income tax. That means, we can and do give the highest quality of instruction *at the lowest cost*. That explains why employment service, when you're half way through and when you finish is a vital part of our agreement with every student. Among the authors of our instruction are the leading radio and electrical engineers of the country. Small monthly payments may be arranged.

American School

Dept. R-433, Drexel Ave. and 58th St. Chicago, Ill.

Get ready for positions as operator or superintendent of broadcasting stations.



Positions paying $50 to $100 a week now open to install, operate and service talking movie equipment.

Soon there will be thousands of fine positions open in TELEVISION

See how easy to learn

—see how quickly you can get ready for a well-paid position in one of the fastest-growing and most prosperous industries on earth!

Just get this picture—three million radio sets manufactured this year on top of 13,000,000 already in use. Hollywood and the movie theatres of the U. S. all gone "talkie". Gigantic expansion of broadcasting—amazing demand for auto-radios—television just about ready to "break". Man! what a chance to get in on the ground floor, like 30 years ago in the auto game—or 50 years ago in electricity!

A FINE RADIO JOB

. . . when you're ready

To meet the growing demand from manufacturers, dealers, jobbers, broadcast studios, "talkie" theatres and other employers, for men with a knowledge of *Radio Engineering*—

—for inspectors, designers, broadcast operators, and superintendents—The American School offers you a *combined training and employment service*, which prepares you for these good jobs in your spare time, *then helps you get one.*

$40 to $75 a week . . . *and more!*

No waiting until you finish—we help you get a beginner's job *when you're only half way through this course.* And after you finish we guarantee to help you find a position, *satisfactory* in *salary*, or money refunded.

Amazing offer *right now* to office and factory workers, 20 to 35 years of age. Mail coupon for lesson, job ticket, and radio book—all free and without obligation.

Radio Tester Given

$20.00 set analyzer and trouble-shooting job tickets a part of this training without extra charge.

THE AMERICAN SCHOOL,
Dept. R-433, Drexel Ave. & 58th St., Chicago

Please send without cost or obligation, free radio lesson and job ticket and radio bulletin.

Name..... Age.....

St. No.....

City..... State.....

Thank You for Mentioning Modern Mechanics and Inventions for April When Writing to Advertisers

I Offer You a Chance to get this Sport Model 3 Place AIRPLANE FREE!

When You Become One of my Students

MAJOR R.L. ROCKWELL

I Will Train You at Home for Aviation and Prepare You to

Earn up to $75.00 to $100.00 a Week

AVIATION—America's newest big industry—offers many opportunities to ambitious men who want to enter a fast growing industry with a bright future.

Just A Few Months

Out of my 14 years of Aviation experience—starting back in war days—I have prepared a Home Training Course in practical Aviation. Just an hour a day for a few months devoted to my Home Training will enable you to master the principles of ground work which you must know before you can qualify for any of the better pay jobs open to men trained in Aviation.

My Home Training Course Is All You Need

When you have finished my Home Training you can qualify for any of the 40 well paid ground jobs. If you wish I will arrange for your flying instructions in Dayton or at an airport near your home at special reduced rates.

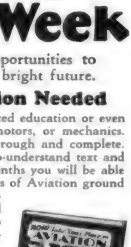
Enroll NOW—and Qualify For This FREE Airplane

All students who enroll now are given a chance to get this Sport Model International 3 place Airplane without one cent of cost. Become one of my students while this offer is on, and let me train you for one of the many well-paid Aviation jobs open only to trained men. I will prepare you to take your place in the most fascinating, fastest growing industry. Rush this coupon to me for a copy of my famous FREE Book and your chance for a FREE Airplane.

Major Rob't L. Rockwell
THE DAYTON SCHOOL OF AVIATION
Desk L-2 Dayton, Ohio

No Special Education Needed

You don't need to have an advanced education or even know anything about airplanes, motors, or mechanics. My Home Training Course is thorough and complete. It is clearly explained, with easy-to-understand text and pictures, so that in a few short months you will be able to grasp the fundamental principles of Aviation ground work and be able to qualify for important aviation work, that will later lead to a job paying $75.00 to $100.00 a week. My Home Training Course will give you the knowledge necessary to pass the government's written examinations for mechanics' or pilots' licenses.



Money Back Agreement

I am so sure you can learn Aviation with my help that if you are not satisfied after you have completed my course, I'll refund every penny you have paid me.

Mail Coupon for FREE Book and FREE Airplane Offer

Major Robert L. Rockwell,
The Dayton School of Aviation,
Desk L-2, Dayton, Ohio.

Dear Major: Please send me FREE a copy of your famous book on Aviation; and your FREE Airplane Offer.

Name ..... Age.....

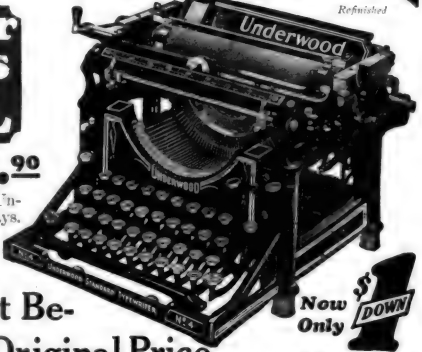
Address .....

Town ..... State .....

Think of it! Genuine UNDERWOOD

Yours for 10 Days TRIAL

Refinished



Regular $100. Model **Now Only 39.90**

Yes—this world-famous Underwood is yours for full 10 days. See for yourself the *real bargain* it is. See how beautiful and new it looks—compare its neat, perfect work—without obligation.

Now Only $1 DOWN

on Easy Terms

Buy Direct at Below ½ Mfg's Original Price

My unchallenged direct sale price and easy terms on this genuine Underwood refinished No. 4 is the lowest ever offered. While they last—less than half (1/2) the manufacturer's original price—and easy terms besides. Do not confuse this genuine late model Underwood with inferior or frail machines worth only one-half as much. This is the full sized standard Underwood with 4-row keyboard and late improvements, manufactured to sell originally for $100. *Fully Guaranteed* in writing.

Easy Terms — Only 10c a Day

Think of it—a genuine late model Underwood reduced to $39.90 (Cash). A saving of over $60 by acting now. Send only $1 deposit for a 10-day Trial. Then only 10c a day on my easy year-to-pay plan. And you use and enjoy your typewriter all the time. This Underwood all refinished like new is without question the greatest value ever offered at this rock-bottom price. (See column to right for its many outstanding features and improvements.)

Limited Quantity—Send at Once!

This exceptional bargain offer is for a very limited time only. Remember, every typewriter is sent on 10-days' Trial and Fully Guaranteed.

International Typewriter Exchange,
231 West Monroe St., Chicago, Ill., Dept. 404.

I am enclosing $1.00 deposit. Please send the Underwood No. 4 F.O.B. Chicago at the special reduced price for 10-day Trial, with the understanding that if I am not perfectly satisfied I can return it Express Collect and get my deposit back. If I keep it I will pay $3 a month until I have paid $41.90 (**term price**) in full.

Name..... Age.....

Address.....

Town..... State.....

FREE Complete 9-Piece Office Supply Set and Typewriting Course

We teach you speed typewriting Free. Complete Home Study Course of the Famous Van Sant Speed Typewriting System, fully illustrated, easily learned. We also give complete office supply set free during this sensational sale.

12 REASONS WHY this is the Greatest Value Ever Offered

1. Genuine Underwood
2. Standard 4-row Keyboard
3. 2-color Ribbon
4. Back Spacer
5. Ribbon Reverse
6. Tabulator
7. Automatic Release
8. Shift Lock
9. Lowest Price
10. Easiest Terms
11. 10-Day Trial
12. Fully Guaranteed

DON'T ENVY THESE MEN

$5000 a Year

"I am with the Scott Transformer Co. Early this year I was promoted to Assistant Engineer with a salary of $5000 a year."—Clifford L. Coon, 1811 Sunnyside Ave., Chicago, Ill.

$400 a Month

"Radio is getting bigger and better. I have made over $400 each month and it was your course that brought me to this."—J. G. Dahlstead, 1484 S. 15th St., E., Salt Lake City, Utah.

$100 a Week

"My earnings in Radio are many times greater than I ever expected they would be when I enrolled. They seldom fall under $100 a week."—E. E. Winborne, 1267 W. Forty-eighth St., Norfolk, Va.

400% Increase

"My income now is about $400 per month, which is 400% increase over my income at the beginning of my enrollment with N. R. I."—J. W. Seasums, 5233 Richards Ave., Dallas, Tex.

$800 in Spare Time

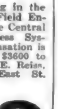
"Money could not pay for what I got out of your course. I did not know a single thing about Radio before I enrolled, but I have made $800 in my spare time."—Milton I. Leiby, Jr., Topton, Pa.

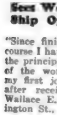
Over $3600 a Year

"I am serving in the capacity of Field Engineer for the Central Public Address Systems. Compensation is expected to run about $3600 to $4000 per year."—Paul E. Reiss, 3015 Regent Place, East St. Louis, Ill.

Sees World as Ship Operator

"Since finishing your course I have taken in the principal seaports of the world. I got my first job the day after receiving my license."—Wallace E. Rushing, 332 Washington St., Hartford, Conn.





$300 a Month

"I occupy a responsible position as control operator with the Onondago Radio Broadcasting Corporation. I average approximately $300 a month, including spare-time work."—Harold J. Mabee, Station WFBL, Syracuse, N. Y.

8 Big Laboratory Outfits

Shown here is one of the many circuits you can build with the eight big home experimental laboratory outfits I send you.

I'll Train You Too for a BIG PAY RADIO JOB

Mail Coupon For Free Book Of Facts And Proof

GET in the big-pay class with the fellows shown on this page. They're some of the men I've trained to earn $50 to $100 a week in Radio. Send for my big free book, "Rich Rewards in Radio." It gives full information on the many money-making opportunities in this fast-growing industry. And it tells how quickly and inexpensively I will train you, in your spare time at home, to fill a big-pay Radio job. My training is so simple and practical that no previous Radio experience or even high school education is required to master it.

Many $50 to $100 a Week Jobs Opening Every Year

Radio is developing so rapidly that hundreds of trained men are needed every year. Broadcasting Stations pay $1800 to $5000 a year to Radio engineers, operators and station managers. Talking Movies pay as much as $75 to $200 a week to men with Radio training. Radio manufacturers employ hundreds of trained men for jobs paying $1800 to $5000 a year. Shipping companies use hundreds of Radio operators, give them world-wide travel, plus good pay and practically all expenses. Radio dealers and jobbers pay $30 to $100 a week to trained service men, salesmen, buyers and managers. And many earn $50, $60, $75 to $100 a week selling and servicing sets in their own business. Now with automobile Radios and low-priced midget sets, sales and service opportunities are greater than ever.

Many Earn $200 to $1000 in Spare Time While Learning

I teach you to begin earning almost at once. The day you enroll, I'll show you 10 ways to make money on the side, repairing, installing, selling Radio sets in your neighborhood. My new 50-50 practical method makes this possible. I send you eight big laboratory outfits that make clear the basic principles of whatever branch of Radio you choose—and show you how to service practically every type of set made. These parts are typical of the practical thoroughness of my course—the only course that enables you to become a *CERTIFIED* RADIO-TRICIAN.

Television and Talking Pictures Included

My training not only gives you a thorough knowledge of Radio—all you need to get and hold a good job—but also, upon graduation, you may take any one of my new advanced courses, without extra charge. They are Television, Aircraft Radio, Broadcasting (Commercial and Ship Radio Stations), Sound Pictures and Public Address Systems, Advanced Radio Servicing and Merchandising.

Low Cost, Easy Terms

My free book tells all about the big opportunities in Radio and how little it costs to prepare for them. It also gives details (information only) money-back agreement and my free Employment Service to graduates. Mail the coupon for this free book of opportunities. Do it today.

Mail Coupon NOW

J. E. SMITH, President
National Radio Institute
Dept. 1-DH, Washington, D. C.

Send me your free book, "Rich Rewards in Radio." I understand this does not obligate me and that no salesman will call.

NAME.....

ADDRESS.....

CITY.....STATE.....

Radio Needs More Trained Men

PATE

Protect Your Ideas

Take the First Step Today

If you have a useful, practical, novel idea for any new article or for an improvement on an old one, you should communicate with a competent Registered Patent Attorney AT ONCE. Every year thousands of applications for patents are filed in the U. S. Patent Office. Frequently two or more applications are made for the same or substantially the same idea (even though the inventors may live in different sections of the country and be entirely unknown to one another). In such a case, the burden of proof rests upon the last application filed. Delays of even a few days in filing the application sometimes mean the loss of a patent. So lose no time. Get in touch with me at once by mailing the coupon on the opposite page.

Prompt, Careful, Efficient Service

This large, experienced organization devotes its entire time and attention to patent and trade mark cases. Our offices are directly across the street from the U. S. Patent Office. We understand the technicalities of patent law. We know the rules and requirements of the Patent Office. We can proceed in the quickest, safest and best ways in preparing an application for a patent covering your idea. Our success has been built on the strength of careful, efficient, satisfactory service to inventors and trademark owners located in every state in the Union.

NO CHARGE for Information

On How to Proceed

The booklet shown here contains valuable information relating to patent procedure that every inventor should have. And with it I will also send you my "Record of Invention" form on which you can sketch your idea and establish its date before a witness. Such evidence may later prove valuable to you. Simply mail the coupon and I will send you the booklet, and the "Record of Invention" form, together with detailed information on how to proceed and the costs involved. Do this NOW. No need to lose a minute's time. The coupon will bring you complete information entirely without charge or obligation.

My Offices Just Across Street From U. S. Pat. Office

Above is a view of my drafting and specification offices where a large staff of experienced experts are in my constant employ. All drawings and specifications are prepared in my offices.

NTS

Inventors Write for these Free Books

Strict Secrecy Preserved

All communications, sketches, drawings, etc., are held in strictest confidence in strong, steel, fireproof files, which are accessible only to authorized members of my staff. Feel free to write me fully and frankly. It is probable that I can help you. Highest references. But FIRST—clip the coupon and get my free book. Do THAT right now.

Clarence A. O'Brien

Registered Patent Attorney

Member of Bar of: Supreme Court of the United States; Court of Appeals, District of Columbia; Supreme Court, District of Columbia; United States Court of Claims. Practice confined exclusively to Patents, Trademarks and Copyrights

Clip this Coupon *and* Mail it *Now!*

CLARENCE A. O'BRIEN, *Registered Patent Attorney*

317-W, Security Savings and Commercial Bank Building
WASHINGTON, D. C.

(or, Suite 1106 Woolworth Bldg., Dept. C-10, New York City)

Please send me your free book, "How to Obtain a Patent," and your "Record of Invention" form without any cost or obligation on my part.

Name .....

Address .....

(Important—Write or print plainly, and address office nearest you)

GENUINE DIAMONDS STANDARD WATCHES *on Liberal Credit Terms . . .*

Guaranteed Savings
Direct Diamond Importations

How to Order—Just send $1.00 with your order and your selection comes to you on **10 Days Free Trial. No C. O. D. to pay on arrival.** After full examination and free trial, pay balance in 10 equal monthly payments.

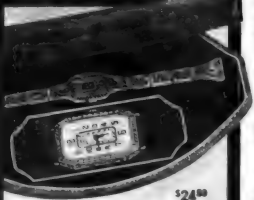
Satisfaction Guaranteed
10 DAYS FREE TRIAL

You have the privilege of 10 days free trial—if not completely satisfied return shipment at our expense and the entire deposit will be refunded. Written guarantee bond with every purchase.

All Dealings Strictly Confidential

Nearly a year to pay! No extra charge for credit—no red tape—no delay. You take no risk—satisfaction absolutely guaranteed or money back.

Gift Case Free. Every article comes to you in a beautiful and appropriate gift case.



$24.50

EL 41 . . . The new Deauville Combination. Beautifully engraved rectangular case. Accurate, dependable 15-jewel movement. Pierced flexible link bracelet with beautiful center design, set with 3 Emeralds or Sapphires and silk grosgrain ribbon band—elegant gift case. Only $2.35 a month.

Diamond Wrist Watch

$37.50

EL 8 . . . Diamond Wrist Watch. 2 genuine diamonds and 8 emeralds or sapphires set in engraved 14K Solid White Gold Case. Guaranteed 15-jewel movement. Pierced flexible "Wristacrat" bracelet with sapphires or emeralds to match. Only $3.65 a month.

LONE EAGLE

$37.50

It's a BULOVA

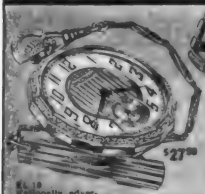
EL 40 . . . "Lone Eagle"—Dedicated to Col. Charles A. Lindbergh—Handsomely engraved lifetime case, guaranteed 15-jewel movement. Radium hands and dial. Patented "dust-tite" protector. Flexible link bracelet to match. Only $3.65 a month.

$48.50

EL 39 . . . "America's Sweetheart." Ultra modern, 18K Solid White Gold engagement ring; finest quality dazzling genuine blue-white diamond in center, 6 matched genuine diamonds on "step-sides." Only $4.75 a mo.

Catalogue FREE To Adults

Completely illustrated new catalog of genuine diamonds, Bulova, Elgin, Waltham, Hamilton, Howard Illinois watches, fine jewelry and silverware at special prices. Write now to get your Free Copy.



$27.50

EL 10 . . . Nationally advertised tested and regulated 15-jewel Waltham movement; 20-year warranted, engraved White Gold filled, 12 size, thin model, decagon case. White gold filled knife, fine Waldemar chain. All complete in fine gift case. Only $3.65 a month.

WALTHAM

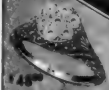
$22

EL 42 . . . Nationally Advertised Waltham or Elgin; guaranteed accurate and dependable. Handsomely engraved lifetime case. Very latest style "Hollywood" bracelet, with extension opening. Only $2.10 a month.

10 DAYS FREE TRIAL

All Transactions

Sent for $1 Balance 10 MONTHS TO PAY



$48.50

EL 12 . . . Dazzling cluster of seven (7) expertly matched genuine blue-white diamonds, hand pierced 18K Solid White Gold, lady's ring. Looks like a $150 solitaire. Only $4.75 a month.

$50

EL 46 . . . Charming new lace design, 18K Solid White Gold dinner ring, set with 3 perfectly matched genuine blue-white diamonds, 2 French blue sapphires on sides. Only $4.90 a month.

$25.75

EL 18 . . . Wedding ring of beautifully hand engraved 18K Solid White Gold set with 7 expertly matched, genuine blue-white diamonds. Only $2.48 a month.

$50

EL 7 . . . Gentlemen's massive ring, 18K solid green gold with the latest style 18K solid white gold tear fiery, genuine blue-white diamond. Only $4.90 a month.

$25

EL 34 . . . Richly hand engraved 18K Solid White Gold solitaire mounting, fiery, genuine blue-white diamond. Only $2.40 a month.

$27.50

EL 22 . . . Gentlemen's massive, hand engraved ring of 14K Solid White Gold Imported Black Onyx with a genuine fiery diamond or any carved initial or standard emblem desired. Only $2.65 a month.

$25

EL 44 . . . Very chic—beautiful hand pierced floral design ring of 18K Solid White Gold, set with genuine Aquamarine or any birthstone; 2 genuine diamonds on sides. Only $2.40 a month.

ESTABLISHED 1896

ROYAL DIAMOND & WATCH CO.

ADDRESS DEPT. 66-R
170 BROADWAY, NEW YORK

Eagles of the Air

YOUNG MAN—

will You be prepared for the

NEW *Opportunities* IN AVIATION?

How
RED JACKSON
Made Good In Aviation

Four years ago this young, freckled face, red headed boy was delivering groceries in a small town. One day when he was carrying a heavy basketful of groceries to a neighbor's house, an airplane flew over his head, and looking up Red said to himself, "That's what I want to be—a pilot. I'm young and I could easily learn to fly." . . . That night Red picked up a magazine and read an advertisement of the Von Hoffmann Aircraft School. He cut out the coupon, sent it back, came on to school and completed his training. Later he was employed by us as one of our flight instructors. In 1928 he set a record of 417 consecutive barrel rolls. In 1930, in company with Forest O'Brine, he established a world record for an endurance flight of over 420 hours. In 1930 he set the present world's record of 647 hours. In the same year, in Chicago, Red set a new record of 56 consecutive outside loops. Those who know Red say he has gained financial independence through his work in Aviation. This reads like a Fairy Tale, but it is true—every single word of it.

Both In the Air and On the Ground

AVIATION has already absorbed thousands of ambitious young men, but Aviation has just started to grow. In the words of America's foremost authorities on Aviation, "The idea of air travel is sound. It is indispensable to commerce and industry." . . . New airports are constantly being built and improved. New airlines are being inaugurated. This creates a need for more executives, pilots, mechanics, and ground men of every class. These vacancies are constantly calling for men who are prepared. In no other line of endeavor is it possible for you to prepare yourself in so short a time at so little cost.

At the Von Hoffmann School, training for every branch of Aviation is thorough and complete. It is one of the few schools in the country with the highest Government rating. This rating was awarded only after the Government made a careful study of our equipment, instructors, and system of training. It is your guarantee of the best training. But the training you get here exceeds the requirement of the Government. The perfect flying climate permits instruction every day in the year. Von Hoffmann graduates are leaders. So, if you would prepare yourself for a place in the Aviation industry get the best that can be had.

Send in the coupon below and we shall send you full particulars.

U. S. Department of Commerce approved School for Transport, Limited Commercial and Private —Ground and Flying Courses.

Located on the famous $2,000,000 Lambert-St. Louis Airport

VON HOFFMANN AIRCRAFT SCHOOL
240 Lambert-St. Louis Flying Field, St. Louis, Mo.

VON HOFFMANN AIRCRAFT SCHOOL
240 Lambert-St. Louis Flying Field
St. Louis, Mo. MAIL TODAY

Name . . . . . .
Address . . . . . .
City . . . . . .
Age . . . . . I am interested in

( ) FLYING COURSE ( ) MECHANICS COURSE
( ) WELDING COURSE ( ) HOME STUDY

PATENTS TRADE-MARKS AND COPYRIGHTS

VICTOR BUILDING
Nearly Opposite U. S. Patent Office

OUR OFFER: FOR PROTECTION OF YOUR INVENTION

YOUR FIRST STEP: The inventor should write for our blank form —**"RECORD OF INVENTION."** A sketch and description should be made on this Blank, signed, witnessed, then returned to us. We also give our opinion as to whether the invention comes within the Patent Office definition of a patentable invention. This "Record of Invention" will serve as "proof of conception." **There is no charge or obligation for this service.**

Write for Our FIVE Books Mailed Free to Inventors
Our Illustrated Guide Book

HOW TO OBTAIN A PATENT

Contains full instructions regarding U. S. Patents. Our Methods, Terms, and 100 Mechanical Movements illustrated and described.

OUR TRADE-MARK BOOK

Shows value and necessity of Trade-Mark Protection. Information regarding **Trade-Marks and unfair competition in trade.**

OUR FOREIGN BOOK

We have Direct Agencies in Foreign Countries and secure Foreign Patents in shortest time and at lowest cost. **Progress of Invention** contains description of World's Most Pressing Problems by Leading Scientists and Inventors. **All Communications and Data Strictly Secret and Confidential.** Interference and Infringement Suits Prosecuted.

DELAYS ARE DANGEROUS IN PATENT MATTERS

IMPORTANT! To Avoid Delay!

YOU SHOULD HAVE YOUR CASE MADE SPECIAL IN OUR OFFICE to save correspondence, secure protection and early filing date in the Patent Office. To secure **special preparation** of your case send $25.00 on account with model or sketch and description of invention. If the invention is not patentable we will return fee less cost of search.

Our Lawyers Practice in all U. S. Courts and Defend Clients in Suits involving Patents, Trade-Marks and Copyrights

OUR ORGANIZATION OFFERS PERSONAL SERVICE

By Experienced Patent Lawyers, Solicitors and Draftsmen
We regard a Satisfied Client as our best advertisement, and furnish upon request, lists of clients in any state for whom we have secured patents. We also assist our clients to sell their inventions.

PAYMENT OF FEES IN INSTALLMENTS

It is not necessary that the total cost of a patent be paid in one payment. We permit our clients to pay for their applications in three installments as the preparation of the application progresses in our office.

Highest References — Prompt Service — Reasonable Terms

WRITE TODAY

VICTOR J. EVANS & CO.

Registered Patent Attorneys **Established 1898**
MAIN OFFICES: 672 NINTH ST., WASHINGTON, D. C.

BRANCH OFFICES: 1007 Woolworth Bldg., New York City; 828 Fidelity Phila. Trust Bldg., Philadelphia, Pa.; 514 Empire Bldg., Pittsburgh, Pa.; 1640-42 Conway Bldg., Chicago, Ill.; 1010 Hobart Bldg., San Francisco, Calif.

FREE COUPON

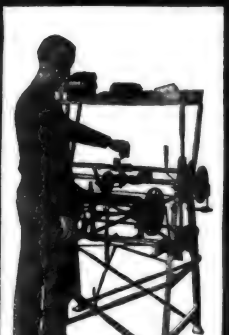
Gentlemen: Please send me FREE OF CHARGE your books as described above.

Name .....

Address .....

Thank You for Mentioning Modern Mechanics and Inventions for April When Writing to Advertisers

YOU can make $4.00 to $6.00 an hour with the IDEAL LAWNMOWER SHARPENER



THIS MAN IS DOING IT!

SO CAN YOU

HERMAN BARBER, Ashland, Ky., writes: *"I have sharpened to date 149 mowers, receiving $968.30. These were sharpened evenings and in my spare time. I have seen other machines, but this is the most perfect one I have seen yet."*

Profits Year After Year

C. S. CONDRON, North Little Rock, Ark., writes that his Ideal Sharpener earned enough in 6 months to pay for itself and $1857 worth of additional machinery. ZENO BRANDON, Middletown, Ohio, writes: *"I have made $320.70 in 55 days with my Ideal. Have made as high as $38.70 in one day."*

W. F. KRENDT, Buffalo, writes: *"I have sharpened 394 lawnmowers last season and the receipts were nearly $2100—not bad for a side line."*

A Big, Permanent Business

S. E. RAUP, Harrisburg, Pa., writes: *"I started sharpening lawnmowers 6 years ago, as a side line, setting up an Ideal in my cellar. Now I am arranging to build a large shop and apartment to take care of my increasing business which employs 2 to 3 men besides myself."*

Hundreds of Dull Mowers Waiting for You

to be sharpened right in your locality—no town too small. WILLIAM G. MERCIER, Oswego, N. Y., writes: *"We have our shop on a truck and travel all over the county."* W. W. DRESSER, Sanford, Florida, writes: *"I live five miles out of town, so have no rent to pay. Collect and deliver mowers. Get $2.00 or better. Buy up old mowers and repair them and make from $4.00 to $10.00 on same."*

Here is Your Chance

Send for the book "LET GEORGE SAY IT"—It's the proof of what we advertise. We also show you the best ways to get the mowers to sharpen.

Now a Two - Methods Sharpener—A Grinder and a Reconditioner—at Practically the Price of One.

The 1921 Model Ideal Lawnmower Sharpener is the ONLY Machine that sharpens the very dull, thin bladed, hard running mowers as well as the slightly dull, easy running ones.

Sharpens Any Mower in 15 to 20 Minutes

Just pick up any mower, set it in the Ideal, make a few simple adjustments and proceed to sharpen. In 15 to 20 minutes after you pick up the mower it is ready for the lawn, and you have made $1.50 to $2.00, depending on the charge you do.

No Training Required

You don't have to be a mechanic to use the Ideal. Its operation is simple and practically automatic once you start to grind.

Set Up Ready to Grind in a Few Minutes

Shipped practically completely assembled. Uncrate it, place in position, plug into a light socket and it is ready to start earning for you.

Special Grinding Wheel Attachment

For sharpening grass shears, hedge shears, sickles, scythes, axes, etc., etc. Will add many dollars to your income.

Skate Sharpener Attachment Included

Sharpens all makes of skates —including hockey, with shoe attached. The "Ideal" earns money all the year round.

Uses Little Power

Operated by ¼ H.P. Motor attached to light socket or can be run direct from line shaft.

Send for FREE BOOK Today

THE FATE-ROOT-HEATH COMPANY

Dept. S, Plymouth, Ohio, U. S. A.

MAKE EVERY SPARE HOUR PAY YOU $4.00 to $6.00

Sign and Mail This Today

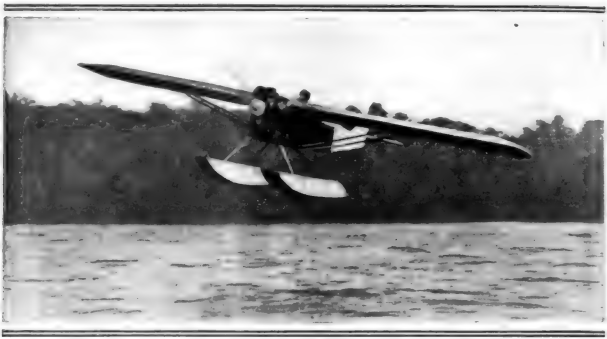
The Fate-Root-Heath Co., Dept. S, Plymouth, Ohio

You'll have to prove that I can make real money with the "Ideal" Sharpener. Send me your FREE BOOK.

Name .....

Address .....

City ..... State .....



How would you like to win enough money in the National Air Races to pay for your home built plane? That's exactly what Walter Franklin of Kanakee, Ill., did with this Church Mid-Wing job.

Andy's Shop Mail Box

What do Double M fans think about? You'd be surprised! Andy, the official grease monkey, each month opens up his sack of fan mail and gives you the latest dope from the hangar gang.

THE Chief of Staff tells me that the mag this month is crammed so full of INTERESTING stuff that I will have to limit my line of bunk to half my normal allotment, therefore I am going to dig right into the mail bag and get to work, sparing you as much as possible of my own inimitable chatter.

The first letter is from Walter Franklin, who hangs out at the Kanakee Airport, Kanakee, Ill. Let him give you the low-down on that crate taking off at the top of the page.

Dear Sir:

The accompanying photo shows the results I have obtained from your "How to Build" story of the Church Mid-Wing which appeared in the 1931 Flying and Glider Manual.

After completing the land plane I decided to try the seaplane, drawings of which were obtained from the Church Airplane Company, and after a very few hours of solo I made my first seaplane flight. Up to the time of deciding to build the new "Speed Step" pontoons I had never actually seen a seaplane other than in pictures. Of course, my experience on the water was to taxi around a bit to accustom myself to the strange feeling, but after a few minutes I took to the air, and to my surprise, the ship handled as easily with pontoons as with wheels.

The clearness of your drawings as outlined in the "How to Build" story, together with plans purchased from the above company, made it very simple for me to construct this plane, and I believe that any other young man can enjoy these same thrills with very little effort.

I am 18 years old and live at 317 S. Wildwood Ave., Kanakee, Ill.

It may interest you to know that I entered my home built ship, piloted by transport pilot Delbert Koerner, in the 1930 National Air races and won second place in a field of six entrants, beating all other makes of light planes using standard equipment, and my prize exceeded the cost of material to construct this ship.

I am an M. M. fan and am pleased that you brought this ship to my attention before I began building any other plane.

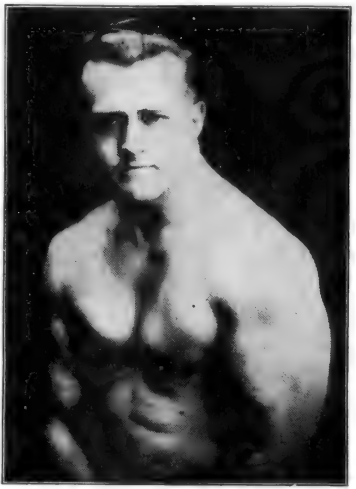
Very truly yours,
WALTER FRANKLIN.

Well, Gang, there's the answer to you birds who write in and want to know if planes con-

(Continued on page 34)

Kill This Man!

THERE'S a devil inside of you. He's trying to kill you. Look out for him! He tells you not to work so hard. What's the use? The boss only piles more work on you. He tells you not to bother with your body. If you're weak—you always will be weak. Exercise is just a lot of rot. Do you recognize him? Of course you do. He's in us all. He's a murderer of ambition. He's a liar and a fool. *Kill him!* If you don't he will kill you.



EARLE LIEDERMAN, **The Muscle Builder**

Author of "Muscle Building," "Science of Wrestling," "Secrets of Strength," "Here's Health," "Endurance," Etc.

Saved

Thank your lucky stars you have another man inside of you. He's the human dynamo. He fills you full of pep and ambition. He keeps you alive—on fire. He urges you on in your daily tasks. He makes you strive for bigger and better things to do. He makes you crave for life and strength. He teaches you that the weak fall by the wayside, but the strong succeed. He shows you that exercise builds live tissue—live tissue is muscle—muscle means strength—strength is power. Power brings success! That's what you want, and gosh darn your old hide! You're going to get it.

Which Man Will It Be?

It's up to you. Set your own future. You want to be the Human Dynamo? Fine! Well, let's get busy. That's where I come in. That's my job. Here's what I'll do for you:

In just 30 days I'll increase your arm one full inch with real live, animated muscle. Yes, and I'll add two inches to your chest in the same time. Pretty good, eh? That's nothing. Now come the works. I'll build up your shoulders. I'll deepen your chest. I'll strengthen your whole body. I'll give you arms and legs like pillars. I'll literally pack muscle up your stomach and down your back. Meanwhile I'll work on those inner muscles surrounding your vital organs. You'll feel the thrill of life shooting up your old backbone and throughout your entire system. You'll feel so full of life you will shout to the world, "I'm a man and I can prove it."

Sounds good, what? But listen! That isn't all. I'm not just promising these things. *I guarantee them!* It's a sure bet. Oh, boy! Let's ride.

SEND FOR MY NEW 64-PAGE BOOK "Muscular Development" **IT IS FREE**

EARLE LIEDERMAN
Dept. 5504, 305 Broadway, New York City

Dear Sir: Please send me, absolutely FREE and without any obligation on my part whatever, a copy of your latest book, "Muscular Development."

Name ..... Age .....

Street .....

City ..... State .....

(Please write or print plainly)

What do you think of that? I don't ask one cent. And it's the neatest piece of reading you ever laid your eyes on. I swear you'll never blink an eyelash till you've turned the last cover. And there's 48 full-page photos of myself and some of my prize-winning pupils. This is the finest art gallery of strong men ever assembled. And every last one of them is shouting my praises. Look them over. If you don't get a kick out of this book, you had better roll over—you're dead. Come on, then. Take out the old pen or pencil and sign your name and address to the coupon. If you haven't a stamp, a postal will do. But snap into it. Do it now. Tomorrow you may forget. Remember, it's something for nothing and no strings attached, no obligation. GRAB IT!

EARLE LIEDERMAN

DEPT. 5504 — 305 BROADWAY, N. Y. CITY

Men don't just fall into easy jobs or big pay positions—they prepare for the big chance before it comes. Make up your mind today what you want to be, then take the first step at once. You don't have to go to college to get ahead. Other men have gone there for you and have put the things they learned there and through years of practical experience into easily understood books which give you a short cut to a better and a bigger job.

We have picked 10 of the best paying professions and have published for your benefit new editions of the most practical, the most valuable books we have ever printed on the subjects covered.

JIFFY INDEX

Our new Jiffy Index makes each book a quick reference work—no time need be wasted in search or study—put your finger on the facts you want instantly.

Special Price List of Pay-Raising Books

Automobile Engineering, 6 volumes, over 2,500 pages, brand new 1931 edition	$24.80
Civil Engineering, 7 volumes, 2,800 pages, nearly 1,000 pictures. Brand new 1931 edition	29.80
Practical Business Administration, 12 volumes, 3,600 pages, (Extra volume containing self quiz reading course of 50 lessons included free)	33.80
Electrical Engineering, 8 volumes, 4,300 pages, 3,200 illustrations	34.80
Modern Shop Practice, 7 volumes, 2,000 pages, 3,670 pictures	29.80
American Law and Practice (with reading course), 13 volumes, 6,000 pages, illustrated	49.80
Sanitation, Heating and Ventilating, 4 volumes, 1,436 pages, 1,000 pictures	14.80
Drawing, 5 volumes, 2,000 pages, 1,546 pictures, blue prints, etc.	19.80
Employment Management and Safety Engineering, 7 volumes, 1,800 pages, 450 illustrations, charts and diagrams	24.80
Architecture, Carpentry and Building, 5 volumes, includes 120 page book "Blueprint Reading" free. Special price—reduced from $24.80	19.80

SHIPPED FREE

Words alone cannot describe the full value these books may be to you, so we ship Free for Examination. Pick the set you want, the price is plainly shown, but **Send No Money**; just your name and address, and the books will be sent promptly.

Take ten full days to read, test and examine them. You'll realize at once what a tremendous force for a better future they can be. After ten days you send only $2.00; then $3.00 per month until the balance is paid. **There Are No Interest Charges of Any Kind**; the price shown is the total cost.

MEMBERSHIP FREE

Anyone who takes advantage now of this opportunity to "Raise his Pay" will be given absolutely free, a certificate of membership in The American Technical Society which entitles him to full consultation privileges with our experts in his chosen field. This is good for a whole year and is of tremendous value in solving special problems.

American Technical Society, Dept. X-4320,
Drexel Ave. at 58th St., Chicago, U. S. A.

Please send me set of.....

for Ten Days' examination. I will examine the books thoroughly and, if satisfied, will send $3.00 within 10 days and $3.00 each month until I have paid the special price of $..... If I decide not to keep the books I will return them at your expense at end of 10 days.

Name .....

Address .....

Reference .....

Stop craving tobacco in any form. **Tobacco Redeemer** in most cases relieves all craving for it in a few days' time. Don't try to quit the tobacco habit unaided. It's often a losing fight against heavy odds, and may mean a distressing shock to the nervous system. Let **Tobacco Redeemer** help the habit to quit you. It is pleasant to use, acts quickly, and is thoroughly reliable.

Not a Substitute

Tobacco Redeemer contains no habit-forming drugs of any kind. It is in no sense a substitute for tobacco. After finishing the treatment, there should be no desire to use tobacco again; or to continue the use of the remedy. In case the treatment is not perfectly satisfactory, we will gladly refund any money paid. It makes not a particle of difference how long tobacco has been used, how much it is used, or in what form—whether it is cigars, cigarettes, pipe, plug, fine cut or snuff. In most cases, **Tobacco Redeemer** removes all craving for tobacco in any form in a very few days. And remember, it is offered with a positive money-back guarantee. Write today for our free booklet telling more about the injurious effect of tobacco upon the human system and convincing evidence that **Tobacco Redeemer** has relieved the craving for tobacco in thousands of cases.

NEWELL PHARMACAL COMPANY
Dept. 867 Clayton Station St. Louis, Mo.

SHAPE your NOSE

Anita Nose Adjuster shapes flesh and cartilage — quickly, safely, painlessly, while you sleep or work. Lasting results. Gold Medal Winner. Doctors praise it. 87,000 users. Write for FREE BOOKLET.

ANITA INSTITUTE, D-75 Anita Bldg., NEWARK, N. J.

1931 FLYING AND GLIDER MANUAL
NOW ON SALE

Public Speaking —Has Its Rewards

If you are interested—

—to develop the ability to speak effectively in public or in everyday conversation—to forge ahead twice as fast as you are now doing, read *How to Work Wonders With Words* now sent free.

This new booklet recently published, points the road that thousands have followed to increase quickly their earning power and popularity.

It also explains how you can, by a new, easy home study method, become an outstanding speaker and conquer stage fright, timidity and fear. To read this booklet will prove an evening well spent.

Simply send name and address and this valuable free booklet will be sent at once. No obligation.

NORTH AMERICAN INSTITUTE
3601 Michigan Avenue Dept. 2054, Chicago, Illinois

Don't say "learning music is hard"

...until you've sent for our FREE demonstration lesson

TIME and again you've wanted to learn to play your favorite instrument; you've longed to get your share of the popularity and personal pleasure that every good musician enjoys—to know the thrill that comes with being able to entertain *musically*.

Yet, so far, you've been "scared" to start.

Why? Is it because you're under the impression that learning music necessitates long years of uninteresting study—lesson after lesson crammed with dry-as-dust theory and endless practicing? Has somebody told you that you need special talent to become a musician?

Then you're in for the surprise of your life. For, now, thanks to the famous U. S. School of Music, the reading and playing of music has been made so downright simple that you don't have to know one note from another to begin.

Easy as Can Be

The lessons come to you by mail. They consist of complete printed instructions, diagrams and all the music you need. Compulsory practice? No. You study only when you feel like it. Personal teacher? No. If you make a mistake you correct it *yourself* and continue. Monotonous scales and harsh-sounding finger exercises? Never. From the very first lesson on you are playing real tunes by note. It's as easy as A-B-C. For before you strike a note, you are told how a thing is done. Then a picture shows you how. Then you do it yourself and hear it. Little theory. Plenty of accomplishment.

A few short months pass quickly by. Almost before you realize it, you are playing selections that fit your mood—you are entertaining others with wonderful classical compositions . . . lighter airs and ballads of haunting beauty . . . dance music that thrills with the fascination of jazz. No wonder that this remarkable method has been vouched for by over 600,000 people from all parts of the world.

Bear in mind no matter which instrument you select—the cost of learning in each case will average the same—just a few cents a day!

PICK YOUR INSTRUMENT

Piano	Violin
Organ	Clarinet
Ukulele	Flute
Cornet	Saxophone
Trombone	Harp
Piccolo	Mandolin
Guitar	'Cello

Hawaiian Steel Guitar
Sight Singing
Piano Accordion
Italian and German Accordion
Voice and Speech Culture
Harmony and Composition
Drums and Traps
Automatic Finger Control
Banjo (Plectrum, 5-String or Tenor)
Juniors' Piano Course

Get Proof Free!

Don't let a lot of false impressions and silly bugaboos delay your start toward musical good times. If you really want to learn to play—if social popularity and increased income appeal to you—then reserve your decision until we send you a Free Demonstration Lesson and a copy of our free illustrated book which describes in detail the famous U. S. School print-and-picture method. Then it's entirely up to you. You're the judge and jury. No obligation involved, of course.

When writing, kindly mention your favorite instrument. Forget that old-fashioned idea that you need talent to learn music and fill in and mail the coupon now. Instruments supplied when needed, cash or credit. U. S. School of Music, 2924 Brunswick Bldg., New York City.

U. S. SCHOOL OF MUSIC
2624 Brunswick Building, New York City

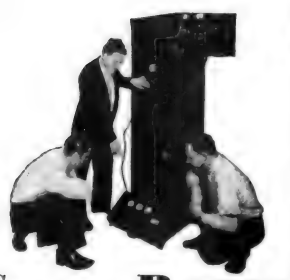
Please send me your free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane. Free Demonstration Lesson and particulars of your easy payment plan. I am interested in the following course:

Have You Instrument? . . . . .

Name . . . . .

Address . . . . .

City . . . . . State . . . . .



Get the RADIO TRAINING you need at home in your spare time

In order to help you learn radio in the shortest possible time, RCA Institutes, Inc., was established. You may study radio at home in your spare time . . . or at any one of the Institute's resident schools throughout the country.

It is not hard to study radio the way it's taught by RCA Institutes. You learn radio by actual experience on the latest type of radio equipment. And you need not give up the position you now hold. You can study an hour a day or any number of hours a day, at home in your spare time.

The RCA Institutes Home Laboratory Training Course teaches you in a most thorough manner. You learn about servicing and selling, operating, radio telephony and telegraphy . . . also instruction in sound motion picture installation, maintenance and repairs. And you receive at no additional cost the complete RCA Institutes home laboratory equipment, a modern outlay of apparatus furnished to every student enabling you to easily solve radio problems.

Home Training Course by America's Finest and Foremost Radio Training Organization

This home training course and free laboratory equipment are backed by more than twenty years' experience.

Send for our FREE BOOK Today!

Everything you want to know about radio . . . describes in detail the home training that has placed thousands of men in good paying positions.

RCA INSTITUTES, Inc.

RCA INSTITUTES, Inc.,
Dept. MC-4
75 Varick St., New York, N.Y.

Gentlemen: Please send me your FREE 40-page book which tells about the many opportunities in Radio and about your famous laboratory method of radio instruction at home.

Name .....

Address .....

Occupation .....

Gas at 6c per Gallon?

Startling, New, Wonderful Vapor Gas Saver, for autos, motorcycles. SENSATIONAL INCREASES. Entirely different. New Fords report up to 61 miles on 1 gallon; old Fords 15; other makes 9-18 to 75%; gains $10,000.00 cash prizes FREE for best gains. Salesmen, County, State, Agencies $250.00 - $1,000.00 month. Agent for trial. ENORMOUS OPPORTUNITY. Write QUICK. CRITCHLOW, Inventor, 3325-A WHEATON, ILL.

No Wind Can Blow It Out

SELF STARTING LIGHTER

SOMETHING DIFFERENT
MYSTERY CIGAR LIGHTER
MAKE UP TO $40 A DAY

Showing this Scientific Marvel to Men. What Makes It Light? New Principle of Ignition. All Guaranteed. No Flint or Friction. Sample with Sales Plan, 25c. Sample Gold or Silver Plated, $1.00. Agents write for proposition.
New Method Mfg. Co., Box M-4, Bradford, Pa.

UNPATENTED IDEAS CAN BE SOLD

I tell you how and help you make the sale. Free particulars. (Copyrighted)
Write W. T. Greene
925 Barrister Bldg., Washington, D. C.

Anyone CAN LEARN

No talent or experience necessary. Fascinating work. Pays big money. Simple instruction. Free book tells about Alphabets, Colors, How to Mix Paints, Show Cards, Window Display and Wall Signs, Ready made letters, Gilding, Process of the Trade, also gives 10 Alphabets and Instructions. Book bound in flexible red leather. Send for it today. Enclose Coupon or Postal Card.
Send now and $3.00, C. O. D. 10 cents.
Ephine Pub. Co., 57 Rose St. Dept. B. N.Y. City

EARN MONEY IMMEDIATELY—
WE FURNISH EQUIPMENT TO START

AVIATION Information FREE

Send us your name and address for full information regarding the Aviation and Airplane business. Find out about the many good opportunities now open and how we prepare you at home, during spare time, to qualify. Our new book "Opportunities in the Airplane Industry" also sent free if you answer at once.

AMERICAN SCHOOL OF AVIATION
Dept. 2054 3601 Michigan Ave. CHICAGO

VEST POCKET ADDING MACHINE

Adds, Subtracts, Multiplies, Divides. Does work of $100 machine. Not a toy. Million dollar engineering, fireside and accurate. Guaranteed 5 years.

FREE TRIAL
—SEND NO MONEY—

$2.50 Total Cost

Just name and address. We will ship Calculator immediately. On delivery pay postman $2.50 (plus few cents postage). (If outside U. S. send cash.) 10c additional in Lambskin Case. If not satisfied after 10 days' trial get your money back. THOUSANDS OF SATISFIED USERS. Write for Agents' Proposition. BABY CALCULATING MACHINE CO. (Mfrs.) P. O. Box 1115, Dept. 81, CHICAGO, ILLINOIS

WE MATCH PANTS

To Any Suit!
Double the life of your coat and vest with correctly matched pants. 100,000 patterns. Every pair hand tailored to your measure; no "ready-mades." Our match sent FREE for your O. K. before pants are made. Fit guaranteed. Send piece of cloth or vest today.

SUPERIOR MATCH PANTS COMPANY
119 So. Dearborn Street, Dept. 947 CHICAGO

autos

NOW EASY TO FIX

SHIPPED FREE ON APPROVAL

6 BIG AUTO BOOKS

BRAND NEW 1931 EDITION

It does not take long for a good automobile mechanic to become known as an expert. The man who can locate any auto trouble instantly and correct it *commands big pay.* These new 1931 Auto Books tell you how to repair any auto fault and they do it so clearly that even if you have never repaired a car before you will understand how—immediately. Over 2600 pages, 1500 illustrations as well as complete wiring diagrams, equipment charts, etc., make these books invaluable to garage owners, auto mechanics or men who want to keep their own cars in perfect condition.

PARTIAL LIST of CONTENTS

Engine Principles
All kinds of motors described, V Type, Straight Eight, Valve Mechanisms, Timing, Types of Pistons—Everything.

Starting Motors
Treated in complete detail. Bendix Drive principles explained fully.

Carburetors
All makes explained, adjustments made easy.

Wiring Diagrams
There are over 100 complete wiring diagrams and data sheets in these books. These were supplied by the manufacturers and are correct in every detail.

Super Chargers
Complete explanation of their operation. This subject is fully covered.

Ignition
Principles are fully explained and detailed illustrations are shown of over 100 wiring systems.

"NO MONEY" OFFER

There are no strings to this "No Money" Offer. It means what it says. Send your name and address with that of your employer, or other business reference on the coupon and the complete set, six books, will be sent to you *FREE* for examination. Keep these books for ten full days. Use them all you want to. Find out anything you want to know about automobiles and then if you do not decide that these books are worth many times their price, and if you do not realize that they will help you make money, send them back at our expense and you will not owe us one cent. If you decide to keep them, send only $2.00 in ten days, and then only $3.00 a month until the special low price of only $24.80 has been paid. If you send now, we will include a certificate of membership in the American Technical Society entitling you to free consultation privileges with eighteen experts for one year.

AVIATION MOTORS
Over 140 pages on this subject. This feature alone makes these books invaluable.

OTHER MONEY MAKING BOOKS SHIPPED *FREE* ON APPROVAL

Our amazing offer to ship FREE applies also to the Encyclopedias shown below. Each has been prepared to help the man without special training, in his trade or profession and to take the place of schooling he may have missed. We can ship one set at a time only on this great offer. Pick the set you are interested in and send for it now.

CIVIL ENGINEERING
7 Volumes
Seven big books, thousands of pages, complete in every way. Price only $29.80.

MODERN SHOP PRACTICE
7 Volumes
The most up-to-date books for mechanic or superintendent ever published. Machine shop practice, tool making, foundry work, in short, everything needed by the shop man. Special price $29.80.

DRAFTING
5 Volumes
The most complete work on Drafting ever published. Five big volumes, thousands of inside every subject fully covered including blueprint reading. Special price $19.80.

ELECTRICAL ENGINEERING
8 great volumes, invaluable to any electrician, student or any one wanting to enter this highly paid profession. Price only $34.80.

AMERICAN TECHNICAL SOCIETY

Remember if you send now on this amazing offer you become a member of the American Technical Society and are entitled to free consultation privileges for one year on the subject covered by the books you order.

JIFFY INDEX Puts Facts at Your Finger Tips

Each book is separately indexed and in addition there is our exclusive "Jiffy Index" covering the entire set. No need to spend time looking for information, in these books you can find it in an instant.

THIS COUPON BRINGS ANY SET OF BOOKS

American Technical Society, Dept. A-4320
Drexel Ave. at 58th St., Chicago, U. S. A.

Please send me set of.....

.....

for Ten Days examination. I will examine the books thoroughly and, if satisfied, will send $2.00 within 10 days and $3.00 each month until I have paid the special price of $.....
If I decide not to keep the books I will return them at your expense at end of 10 days.

Name .....

Address .....

Employer or other Reference .....

Address .....

Classified Advertisements

MONEY-MAKING OPPORTUNITIES IN TABLOID FORM

Rates for classified ads, 15 cents per word per insertion, or 12 cents per word per insertion for six insertions. Minimum 10 words. Cash should accompany order. Closing date 20th of third month preceding date of issue. Address Classified Manager, Modern Mechanics Magazine, 33 East Wacker Drive, Chicago, Ill.

ADVERTISING

INCH Display Advertisement 50 Magazines Year $24. Wood's Popular Services, Atlantic City.

ANALYSIS

ANY product analyzed so that it can be duplicated. $5.00 or money refunded. Doris Chemical Laboratories, 1311Z East 84, Cleveland, Ohio.

AVIATION

MODEL Airplane Builders send 5c for Supply catalogue and plan to earn money. National Model Aircraft & Supply Co. 29-MI North Ave., New Rochelle, N. Y.

OUR large Ford Motored Monoplane easily assembled at home with simplified construction kit. Easy payments. Literature 10c. Federal Equipment Co., Hartland, Wis.

BUYERS DIRECTORY listing where to buy thousands bargains, used, surplus, new airplanes, motors, jumping balloons, blimps, gas, parachutes, power gliders, wheels, wings, fuselages, etc. 50c. Midwest, 603-5 Security Mutual, Lincoln, Nebr.

GET our Latest Catalog on Aircraft motors, propellers and supplies for Sport Planes, Snow and Ice Sleds. Clearance Sale of New and Used Motors now on at bargain prices. Send ten cents in stamps to cover cost. The Sensenich Bros., Lititz, Pa.

METAL tipped propellers for Henderson and Big V motors $9.95 each. Hibbs, Ft. Worth, Texas.

NEW HEATH M Aircraft Engine—the perfected power plant for your light plane. Absolutely free from all vibration and bearing difficulties. Delivers 30 horsepower at 3,000 R.P.M. Price only $300 including propeller hub. Also remanufactured Heath Henderson Motors as low as $190. Fully guaranteed. 10 cents in stamps or coin brings large illustrated booklet. Heath Aircraft Corporation, Dept. CL26-M, Chicago.

SB PROPELLERS will give your plane, snow or ice sled pleasing performances. Construction Blue Print of Speedy Ice Sled $2.00. Henderson Motor Conversion Blue Print $1.00. Harley Davidson Conversion Blue Print $1.00. Send ten cents in stamps for all literature. The Sensenich Bros., Lititz, Pennsylvania.

BIGGEST, Best Catalog Model Airplanes, Parts, Supplies; 5c postpaid. Ideal Company, 19-23 West 18th Street, New York.

HEATH PARASOL — Stop wishing you could fly. Now fly in all weather, America's most popular sport plane—winner of light plane event at 5 consecutive National Air Races. Build it for $199. Parts may be purchased in 11 convenient progressive groups. $12 brings first shipment. Heath plans and detailed explanation sheets so complete even the unskilled can follow. 10 cents in stamps or coin brings large illustrated booklet. Heath Aircraft Corporation, Dept. CL25-M, Chicago.

SENSATIONAL new fuselage fitting for steel tube fuselages. Saves 75% work, no bending, welding, chiseling, necessary. Comes completely finished. 30c each, sample with circular 25c. Agents wanted. Russell Aircraft, Box 455, Toledo, Ohio.

AGENTS WANTED

YOU are wanted to Resilver Mirrors at home. Profitable business plating autoparts, tableware, etc. Write Sprinkle, Plater, 850, Marion, Indiana.

SUCCEED With Your Own Products. Make them yourself. Formulas, Processes. Catalog free. A. Thaxly Co., Washington, D. C.

FREE Circulars describing how you can make $10,000 yearly in a Mail Order business at home. Agrah, Publishers, 1217M., Avenue U., Brooklyn, New York.

$380 MONTHLY selling 10 New Improved Window Washers daily. Cleans, dries, polishes. Approved by Good Housekeeping. Restricted territory. Write today. Carter Products Corp., 1005 Front Ave., Cleveland, Ohio.

GREAT success making your own products! Start selling them. Start this fastest Big Money Business. My "Eye-Opening" literature tells how and lists Formulas, Processes, Trade-secrets of Best-Selling Specialties—all kinds—all lines. Investment small, profits immense. Start anywhere. Miller, Chemist, 1706-B Miller Chemical Building, Tampa, Florida.

MAKE Your Own Products. Employ Agents Yourself. Toilet articles, soaps, extracts. We furnish everything. Valuable book Free. National Scientific Laboratories, 1964W Broad, Richmond, Va.

NEW, Vest Pocket Adding Machine—Subtracts also. $100 machines—costs only $2.50. Lightning fast. Guaranteed accurate. Sells on sight to offices, stores, those who use figures. More than half profit. Write today for FREE SAMPLE offer and full details. Cleary, 303 West Monroe, Chicago, Ill. Dept. 25.

MAKE Big Pay and liberal merchandise bonuses selling guaranteed Shirts, Ties, Hosiery, Underwear. We finance you. Scientific Sales Kit Free. Supply limited. Write for yours today. Public Service Mills, Dept. D-14, West New York, N. J.

CALIFORNIA Perfumed Beads selling like Hot Cakes. Agents coining money. Big profits. Catalog free. Mission Factory K, 2328 West Pico, Los Angeles, California.

MANUFACTURER wants distributor for new "Pocket Radio", only $3.85. "Sells itself with music". Pays 100% profit. Spencer Radio, Dept. 23, Akron, Ohio.

BIG MONEY daily selling Shirts, Ties, Underwear, Sox, Pajamas, Belts, Professional Uniforms, Raincoats, Coveralls, Pants, Children's Playsuits, Outfit FREE! Experience unnecessary. Nimrod Co., Dept. 132, 4922-28 Lincoln Ave., Chicago.

AGENTS new directory lists 9⅝ wholesale firms. Pruett, Brookfield, Ill.

STRANGE Battery Compound charges instantly. Eliminates old method. Gives new life and big profits. Gallon free. Lightning Co., St. Paul, Minn.

BIG MONEY and Fast Sales. Every owner buys Gold Initials for his auto. You charge $1.50; make $1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 11, East Orange, N. J.

YOU make over 300% profit selling changeable signs to stores for $1.50 each. Particulars free. National Sign System, St. Louis, Mo.

SELL 9x11 Blue signs anywhere. $3.50 brings 100 best sellers. Handy container. Write, Kaylor's, 717 N. Fourth, St. Louis, Mo.

MAGIC GAS Equals Gas 3c Gallon. Harmless guaranteed product. Used by largest Bus Companies. Circulars, Labels, Letterheads with Agent's name furnished. Particulars and proof free. P. A. Lefebvre & Co., Ltd., 43 Magic Gas Bldg., Alexandria, Ont.

AGENTS' Gold Sign Letters for store windows. 1000% profit. Free sample. Metallic Letter Co., 426 N. Clark, Chicago.

BUILD YOUR DOANE SPEED BOAT

THOUSANDS HAVE. Save two thirds cost. Outfit family runabouts, race-winning hydroplanes (Doane Hydroboat, Marathon, etc.) or 45 mile inboard Hydroplane. Real sawn frames on steam bending; no mystery. Famous Doane speed, stability, staminagood for years. Complete instructions and pattern plans or ready parts and equipment. Send ten cents now for V. B. Foler, Doane Marine Works, Stamford, Conn. "You can build a better boat than you can buy."

BOATS

BUILD Your Own Boat: Any amateur can build Handsome, Seaworthy Boat using our Ready-Cut Semi-assembled materials. Outboard Speedsters, Runabouts, Cruisers, Launches, Sail and Row. 55 Designs. Send 10c for Catalog. Brooks Boat Co., Inc., Box M31, Skaneateles, West Side, Michigan.

BUSINESS OPPORTUNITIES

MAKE MONEY collecting money. Become a collection manager or start a paying business of your own, spare or full time. Good income. Quick results. Interesting booklet sent free. National Collectors Association, 20 Connell Bldg., Newark, Ohio.

SCREW-HOLDING Screw Drivers! Remove, insert screws from inaccessible places! Factories, garages, electricians, mechanics, auto, radio owners buy on sight! Exclusive territory. Free trial! Toolco., 1743 Water Street, Boston.

$100.00 Weekly in Household Repairing. Particulars. Houlgate, 1205 North El Molino, Pasadena, California.

TATTOOING Outfits, Supplies. Illustrated list free. "Waters" M-965 Potnam, Detroit.

Thank You for Mentioning Modern Mechanics and Inventions for April When Writing to Advertisers

Classified Advertisements

MAKE and sell your own toilet preparations. Fifteen valuable formulas 50c postpaid. Joseph H. Belfort, 4042 N. Keeler Ave., Chicago, Ill.

COMPLETE Chemical Service. Analysis, Formulas, Consultations. State Licensed Chemist. Twenty-five years' experience. Write for literature. W. L. Cummings, Ph.D., 428 Gordon Avenue, Syracuse, N. Y.

AMATEUR cartoonists, earn $25.00 week, spare time, copying cartoons for advertisers. Three-M Syndicate, Argyle, Wis.

CAST your own Lead Soldiers, Indians, Hunters, Wild and Farm Animals. 235 different moulds to select from. Send 5c in stamps for illustrated catalogue. Henry Schiercke, 1034 22nd St., Brooklyn, N. Y.

CANCELLED STAMPS and COINS bought

$10 PAID $1000. $5 to $100. For Coins Book Prices 10c. Rebuse Cohoes, New York.

CHEMICALS

THE New POPULAR CHEMISTRY contains latest chemical news, chemical poems, formulas, answers to questions, etc. Send for three back issues or $1.00 for one year (nine issues) subscription. Popular Chemistry, Dept. M, Swedesboro, N. J.

DUPLICATING MACHINES

"EXCELLOGRAPH" Portable Rotary Stencil Printing Duplicators $39.00. Equipped. Terms, description, testimonials, printed samples, Free. Pittsburgh Typewriter Supply Co., Dept. 540 Pittsburgh, Pa.

DETECTIVES

DETECTIVES Earn Big Money. Excellent opportunity. Experience unnecessary. Particulars free. Write, George Wagner, 2190-V Broadway, N. Y.

ELECTRICITY

ELECTRIC FUN! 200 stunts 110 volts, $1. Cudding Sons, Campbell, Calif.

FARM LAND

WANTED to hear from owner having farm or unimproved land for sale. John Black, Chippewa Falls, Wis.

TEN Dollars monthly acquires five acres Pecans, Tungs, Figs, Oranges. Guaranteed care. Big returns. Suburban Orchards, Dept. X, Biloxi, Miss.

OZARKS—20 acres, timbered, poultry, fruit, berry land. Hunting, fishing. $100.00, $5.00 monthly. Hubbard, 227 Grossman Bldg., Kansas City, Kans.

FIELD GLASSES

BINOCULARS, Field Glasses, Telescopes, Microscopes. New; used, $1 up. 8x Binoculars $11. All makes. Large assortment. Catalog free. DuMaurier Company, Dept. 144A, Elmira, N. Y.

FORMULAS

500 Formulas and illustrated Catalog 25c. Ideal Book Shop, Park Ridge, Ill.

ANY formula $1.00; absolutely guaranteed, or money refunded. Send for free lists. Doris Chemical Laboratories, 1311B East 84, Cleveland, Ohio.

MAKE MONEY with your own products. Formulas, recipes, processes. Lists free. Industrial Institute, Dept. 304, 64 West Randolph, Chicago, Ill.

FOR SALE

HEATH PROPELLERS — give immeasureably finer performance because they are designed by skilled engineers to fit each individual job. Cost no more than ordinary stock propellers yet are guaranteed to give added propulsion to sleds, boats, and airplanes. 4 cents in stamps or coin brings complete propeller catalog. Heath Aircraft Corporation, Dept. CL24-M, Chicago.

WATCHMAKERS Lathe for sale at a bargain. R. Jaegermann, 5815 Easton Ave., St. Louis, Mo. Dept. 10.

FOR INVENTORS

GET Patents Yourself. Legal blanks, instructions, $1. Cudding Bros., Campbell, Calif.

FOR INVENTOR'S Universal Educator: contains 900 mechanical movements; 50 Perpetual Motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price and postpaid in U.S.A. Address Dieterich Co., 602A, Ouray Building, Washington, D. C.

INVENTORS—Sell your inventions before patenting. Free particulars. Write W. T. Greene, 942 Barrister Bldg., Washington, D. C.

I SELL patents: A Service for the inventor. Established in 1900. Experienced, respected. Why take chances? Charles A. Scott, 773MM Garson Ave., Rochester, N. Y.

PROTECT Unpatented Inventions, and guaranteed assistance to success. $1.00 Particulars Free. Wm. Robinson Inventor, Dept. 66 Law Wis. Box 22.

GUMMED LABELS

PROFITABLE Business Producer! Colorful gummed stickers. Harvey Wolf, 6618D Quimby, Cleveland, Ohio.

HYPNOTISM

25 LESSONS in Hypnotism. $1.00 postpaid. J. Tillberg, Proctor, Vt.

HOME WORKSHOP

DEPRESSION price for set of twelve complete working plans with drawings and instructions. Shows how to make 14" bandsaw for $3.00, etc. Act immediately. Send $1.00. Edmond Nogar, 1740 Mineral Springs Road, Reading, Pennsylvania.

HELP WANTED MALE—INSTRUCTION

Beginners trained for positions in Southern and Northern hotels. Lee Institute, 151 Perkins, Somerville, Mass.

FIREMEN, Brakemen, Baggagemen; colored Train or Sleeping Car Porters, $150—$250 monthly. Experience not necessary. 313 Railway Instruction Bureau, East St. Louis, Ill.

DETECTIVES. Work home or travel. Experience unnecessary. Write, American Detective System, 2188 Broadway, N. Y.

MALE HELP WANTED

GET outdoor gov't job; $140-$200 month; vacation. Patrol forests and parks; protect game. Write for details, DELMAR INSTITUTE, B56, Denver, Colo.

GO INTO BUSINESS — Make Big Money. We start you furnishing everything. Experience unnecessary. Federal Pure Food Co., G2307 Archer, Chicago.

MALE, FEMALE—HELP WANTED

MAKE $20 per 100, stamping names on Keychecks. Sample and Instructions, 25c. Keetags Co., Cohoes, N. Y.

MAKE big profits silvering mirrors. Easily learned patented process. Plans free. Wear Mirror Works, MM, Excelsior Springs, Mo.

POSITIONS on ocean liners; Experience unnecessary. List of positions free. 292-G, Mount Vernon, N. Y.

MODELS

POWER MODELS. Steam and Gasoline Engines, accessories, supplies, metals for modelmakers. Catalog 35c. C. Cole, 1355 Church St., Ventura, Calif.

INVENTORS: Send us sketch or crude model of your idea. Crescent craftsmen will develop it into a practical working model. 30 years of successful experience and thousands of satisfied clients. Confidential service guaranteed. Bank references furnished. Free illustrated book: "Making Inventions Pay." Crescent Tool Co., Dept. T-4, Cincinnati, Ohio.

MODEL SUPPLIES

FAMOUS Enterprise (Boat) Blue Prints, 6 full size drawings $1.50. DO-X Blue Prints. 7 full size drawings $1.50. Hawk Model Co., 4944 Irving Park Blvd., Chicago.

MAGIC GOODS

MONEY in Magic—Beautiful catalogue, 10c; stage money, 50 bills, 20c. Oaks Magical Co., Dept. 200, Oshkosh, Wis.

FOUR Big Magic Catalogs and Seven Mystifying Optical Delusions postpaid 15c. Gilmagico, Morgan Park, Chicago.

MISCELLOUS

QUIT Tobacco Easy. Harmless home treatment. The NI-KO System, Ojai, California.

MOTORCYCLES

SEND 15c today for latest illustrated used motorcycle catalog. Large stock Real bargains. Indian Motorcycle Sales. Dept. MM., Kansas City, Mo.

NOVELTIES

DIME brings sample amazing novelty. Mystifies everyone. Dealers wanted. Laurel, 627 E. Fifth, Winona, Minn.

OLD COINS

SPECIAL PRICES on United States old coins. Half Cent 32c; Large Cent 9c; Eagle Cent 9c; White Cent 5c; 2c Bronze 8c; 3c Nickle 9c; Half Dime 15c; Trade Dollars $1.75; Bargain Price List and old coin 10c; EMARCIE, Box 482, Muskogee, Okla.

PRINTING

5000 TINTED Enamel Folders, $13.75; 5000 Colored Envelope Slips, $5.00; 5000 6x9 Circulars $7.50. All printing low prices. Samples. Goodprint, Harrisonburg, Va.

PATENTS

INVENTIONS commercialized. Patented or unpatented. Write, Adam Fisher Mfg. Co., 582 Enright, St Louis, Mo.

PATENTS FOR SALE

MOTHPROOF Cabinet having removable sections on top. U. S. Patent No. 1526599; Canada Patent No. 253188. Alice Hewitt, 609 Allegheny Ave., Pittsburgh, Pa.

CLASSIFIED ADVERTISEMENTS—CONTINUED

RADIO

CRYSTAL Radio Fans; Melomite Crystal improves reception, price 25c, postpaid. Melomite Crystal Radio, $1.00. Complete, phone, aerial, $2.95. Music Sales, Dept. B-A, Independence, Mo.

RADIO SUPPLIES

Supersensitive transmitter buttons, 70c each, 2 for $1.25. Bernard Novitsky, Box 35, Pittston, Pa.

STAMPS

30 DIFF. Canada by Airmail only 15c to approval applicants. Lists free. Victoria Stamp Company, London, 7, Canada.

105, CHINA, Etc., 2c. Album (500 illustrations) 3c. Bullard, 446 Tremont, Boston.

STAMPS! 100 diff. 2c; 500 diff. 24c; 1000 diff. 75c. Tatham Stampco, D9, West Springfield, Mass.

SONG WRITERS

SONGWRITERS! Advance royalty payments, new talking picture song requirements, etc., fully explained in our free instructive booklet. Write today. Song poems examined free. Newcomer Associates, 1674 Broadway, New York.

SONGWRITERS, poems wanted. Malie, MM3706 Grand Ave., Chicago.

$7,500 PAID for one song! More wanted! Particulars free. Greenstreet, Park Avenue, Kewanee, Ill.

TRICK CARTOONING

LEARN Trick Cartooning. Make money spare time. Easy with my instructions and portfolio over 100 drawings. Complete outfit 50c. B. Roberts, 5437 N. Sawyer, Chicago.

WIRELESS

LEARN Wireless (Radio) and Morse telegraphy. School, oldest and largest; endorsed by Telegraph, Radio, Railway and Government officials. Expenses low—can earn part. Catalog free. Dodge's Institute, Clark St., Valparaiso, Ind.

BE A MAGICIAN!

I WILL TEACH YOU, FREE!

Be popular in any crowd. Give exhibitions at clubs, parties and lodges. I can teach you hundreds of entertaining tricks in just a few hours so you can delight your friends and be invited everywhere.

12 MAGIC TRICKS SENT FREE

To prove how quickly you can learn, I will send you 12 amazing magic tricks and teach you how to do them—ABSOLUTELY FREE. Send only 25c to cover postage, packing, etc. Write today to

A. P. FELSMAN, Inc., Dept. 111, 431 N. Clark St., Chicago, Ill.

LAW — HOME STUDY Training Program

Write today for new Free book. It tells you how a law training will shorten your road to success. It also carries a vital and inspiring message to every ambitious man. Find out about the opportunities that await the law trained man. Find out how you can learn law right in your own home. No obligations. The book is FREE. Write today.

American Correspondence School of Law
3801 Michigan Avenue, Dept. 2054 Chicago, Illinois

INVENTIONS WANTED

Patented or unpatented. If you have an idea for sale, write

HARTLEY'S INC., Box 328-B, BANGOR, MAINE

PATENT YOUR IDEAS

REGISTER YOUR TRADE-MARK BY

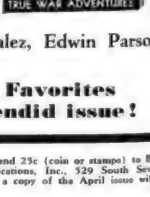
Z. H. POLACHEK
1234 BROADWAY
31st NEW YORK

REG. PATENT ATTORNEY PROF. ENGINEER

WHAT IS YOUR INVENTION?
Send me a simple sketch of a model for CONFIDENTIAL ADVICE — DO IT NOW!

Arthur Guy EMPEY'S

"The Spy Net"



The ace of Battle Stories authors invites you to match wits with him in this thrilling tale of the men who planned, schemed, fought, and died with only a number for a name.

ALSO—True Stories of War Adventures by Benge Atlee, Lloyd Kohler, Sgt. Rentfrow, Jay Kalez, Edwin Parsons

In the APRIL issue of

Battle Stories

All Your Favorites in this splendid issue!

If your newsdealer is sold out, send 25c (coin or stamps) to Battle Stories Magazine, Fawcett Publications, Inc., 529 South Seventh Street, Minneapolis, Minn., and a copy of the April issue will be mailed to your address at once.

Thank You for Mentioning Modern Mechanics and Inventions for April When Writing to Advertisers

I'll Help You RAISE YOUR PAY

My Pay-Raising Plan

My Plan Is Sent To You **FREE!**

"I can prove that John Savadge, trained by me, makes $300 a month! A. H. Bernier, trained by me, earns $7,000 to $9,000 a year. Arthur DeWalt, trained by me, makes more than $400 a month. D. C. Stroop, trained by me, makes $475 a month. L. V. Broughton, trained by me, makes $300 a month. Write for this book to help you get more pay."
—Engineer Dobe

Successfully Used For Over 30 Years
—Engineer Dobe

More Pay-Making Tools For You!

Why work all your life for small pay and with little chance for a raise or promotion? Let me train you for *Higher Class Work* and *Better Pay*. Get my *Pay-Raising Plan*—NOW. I'll send it to you FREE. It will convince you and show you a way to build a big future for big pay, on clean work leading to salaries of $60-$70, and up to $100 a week salary.

All buildings, machinery, automobiles, motor busses, airships, electrical apparatus, all manufacturing and construction of any sort, depend upon draftsmen.

I train you by mail in your spare time. You keep your job while learning. I give you an opportunity to earn extra money.

I send you this book FREE in connection with my offer to train you at home in drafting. Jobs waiting for draftsmen.

The higher positions in plants, factories and business houses are filled by men with a foundation originally as Draftsmen.

When trained by me, I help you get a job without charge. Employers of draftsmen come to me for competent draftsmen at $60 —$70 to $100 a week straight salary.

All Your Tools and Draftman's Folding Table are furnished by me when I train you on drafting work for **More Pay! Steady Pay!**

No previous experience is necessary. You do not need to be a college man or high school graduate. I'll train you 'til you're in a position and EARN MORE PAY at steady work. ALL TOOLS are FURNISHED BY ME.

"FREE" Pay-Raising Plan

ENGINEER DOBE,
1951 Lawrence Ave., Div. 23-54, Chicago

Please send me, free of all cost, "My Pay-Raising Plan", also FREE Drafting Book and Draftsman's Pocket Rule, ALL FREE.

Name _____ Age _____

Address _____

Post Office _____ State _____

Mail This Coupon

"You'll get your raise."
—Engineer Dobe

If You Earn Less Than $70 a Week

Mail this coupon now, and I will send you "My Pay-Raising Plan", Drafting Book and Draftsman's Pocket Rule—postpaid and free.

Engineer Dobe, Div. 23-54
1951 Lawrence Av., Chicago

Earn Big Profits

Show this Remarkable New

R & R *Portable* Ventilator

Sells on Sight

— to —

Cafes
Stores
Homes
Offices
Garages
Factories
Store Rooms
Cleaning Plants
Indoor Golf Courses
Small Theaters
Paint Shops, etc.

Urgent Demand Everywhere

AGENTS—*act now!*

Here is a real money-maker for you! A remarkable new *portable* ventilating system. **Absolutely new. The only device of its kind on the market.** Just what stores, restaurants, offices and other business places everywhere have been waiting for. They *need* it and *want* it—right now. Prospects are all around you. Unlimited demand. The market is **ripe** and **untouched.** *Investigate* this big profit opportunity today!

Quickly Demonstrated

This ingenious ventilator *sells itself.* You simply plug it into an electric socket to demonstrate. Fits anywhere. By being *portable* it can be moved about and placed in any desired location. It can be used either as an exhaust or as a draft fan. A necessity the year 'round. Furnished in attractive colors—black, red, blue and cream.

Details of Construction

The R & R Ventilator is designed on aircraft principles. Has a two blade airplane propeller which is carried on two Strom ball bearings, running in a pack of grease. It is driven by a V belt, and a ¼ H. P. motor is mounted in the base of the tunnel. By this construction, it makes the ventilating system a portable unit, *and does not have to be bolted down,* owing to the perfect balancing of the propeller and the motor. The venturi opening has a mouth of 24" diameter, and the main tunnel is 17" in diameter.

Write Today!

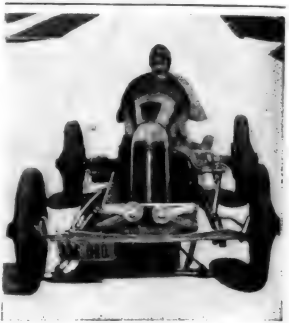
Send at once for full details of our liberal sales proposition. No obligation. *Write today!*

R. & R. MFG. Co., Dept. MM-1, Anderson, Ind.

ANDY'S SHOP MAIL BOX

(Continued from page 24)

structed from our plans can really fly. You know now, don't you? I hope you also noticed that Walter followed the plans as given instead of trying to dope himself a freaky combination of several ships, combining the best features of all in a misfit combination that couldn't leave the ground, to the great good luck of the pilot. Every "How to Build" we give you is the result of months of work on the part of an experienced aeronautical engineer. The job has been thoroughly tested and proved airworthy before it was passed along to you.



Here's a souped up Model T Ford racer designed and built by C. M. Webb, of Elizabethton, Tenn.

I've been kinda neglecting you dirt track racing bugs, but I'm going to give you a break now. Take a slant at that snap above and then pucker up your eyebrows and read what follows:

423 Carter Boulevard,
Elizabethton, Tenn.

Dear Andy:

I think I have waited long enough for you to hear from some of these dirt track racing birds. It is about time some of them are breaking into print in your column. I am now taking the chance myself.

The boys are always talking about souping up motors, so here is a good one for them to think about. When they take a Model T Ford and make her give them 107 miles per

(Continued on page 42)

ARE TODAY'S MOST COMPETENT AND TRUSTWORTHY PILOTS

Here's Why: Parks standards for graduation are so high that the man who meets them must be a better-than-average pilot! We will not give an inferior man the indorsement of our diploma. In cold fact, Parks Air College has dismissed 249 students (more than most flying schools have graduated) and has qualified 1071 graduates.

The student's first lesson here is that stunting and unnecessary risks have no place in commercial flying. The Parks code calls for the best in personal character and habits. Drunkenness and dishonesty are cause for instant dismissal. Loyalty and responsibility are recognized and rewarded. Cheerful performance of required manual labor, for grading purposes, marks the pilot who will not desert his post in an emergency.

Our system of grading definitely rates every characteristic of our graduates—and their performance after graduation has checked with our rating in 95% of all cases. Every Parks Transport Graduate has had, as a part of the required 200 hours, 10 hours night solo, 10 hours solo on 5000 lb. gross weight ships, and 8 hours solo on Lockheeds. You can entrust plane and passengers to one of them with the same confidence you feel in the engineer when you board the Twentieth Century Limited.

✖ ✖ ✖ ✖ ✖

This statement means as much to prospective students as to airline operators. Parks training does more than equip you for success—it gives you a backing which you cannot get elsewhere.

If you're serious about aviation, come to Parks! And mail the coupon for the book that tells all about it.

Send me "Skyward Ho!"—(24 page book, fully illustrated.) I am interested in:
☐ Mechanic's Course
☐ Limited Commercial Course
☐ Transport Course

PARKS AIR COLLEGE

WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

APPROVED BY UNITED STATES DEPARTMENT OF COMMERCE

SECTION 4-MM
PARKS AIRPORT
E. ST. LOUIS, ILL.

Name_____ Address_____

City_____ State_____ Age_____ Occupation_____

$2 to $3 An Hour In Your Own Cash Business

FREE PLAN Starts You At Home In Spare Time

This is your big opportunity to get into a fine paying business of your own. Many men who have started in spare time have built up a wonderful permanent business that pays them big money. Martin Fischer writes, ". . . *Started filing while I was a chauffeur. Second year had to quit my job because I could not handle all the filing. Now I have a nice shop and a bank roll besides . . .*"

No Experience Necessary

Filing all kinds of saws on the Foley *Automatic* Saw Filer is easy work. You can turn out perfect work by following the simple instructions. Does better work than the most expert hand filer. Satisfied customers will soon help you build a fine, steady business that pays BIG PROFITS. Fred M. Bell writes, ". . . *On the average I make from $8 to $10 a day . . .*"

Mail Coupon for FREE PLAN

Foley Mfg. Co.,
288 Foley Bldg., 11 Main St. N.E.
Minneapolis, Minnesota.

Please send me FREE PLAN and tell me how I can have my own Cash Business with the Foley Automatic Saw Filer.

Name .....

Address .....

Rotary Stencil Duplicator $39

Print Bulletins, Circulars, Programs, Letters, with the Amazing "EXCELLOGRAPH"

Simple and easy. **Just write, typewrite, draw or trace** on dry stencil; place in position and print up to 1,000 copies per hour. **All supplies and instructions furnished.** Guaranteed 10 years. Prints any size from postcards to sheets 9x14. Does beautiful work.

SAVE MONEY—MAKE MONEY

Saves and makes money for Merchants, Ministers, Teachers, Offices etc. **Use it to build your business.** Do work for others at big profits.

Write for Free Book—TODAY

Shipped at our risk. POSITIVE MONEY-BACK GUARANTEE. Amazing value. Thousands in use. Get free book describing all details and easy payment plan.

Easy Terms

PITTSBURGH TYPEWRITER & SUPPLY COMPANY
Dept. K2 339 Fifth Ave. Pittsburgh, Pa.

NEW LOW PRICES

GOODRICH-GOODYEAR
Firestone - U.S.
AND OTHER TIRES

Lowest Prices on Earth!
Thousands of satisfied tire users all over the U.S.A. Our 15 years of business speaks for itself. This big responsible company will supply you with reconstructed standard maketires at lowest prices in history—
Guaranteed to give 12 months' service

Don't Delay—Order Today

CORD Tires Size	Tires	Tubes	BALLOON Tires Size	Tires	Tubes
30x3	$2.20	$1.00	29x4.40	$2.30	$1.10
30x3½	2.25	1.00	29x4.50	2.40	1.15
31x4	2.95	1.15	30x4.50	2.45	1.20
32x4	2.95	1.15	30x4.95	2.90	1.35
33x4	2.95	1.15	28x5.25	2.95	1.35
34x4	3.50	1.15	30x5.25	2.95	1.35
32x4½	3.20	1.45	31x5.25	3.10	1.35
33x4½	3.20	1.45	30x5.77	3.20	1.40
34x4½	3.45	1.45	32x6.00	3.20	1.40
30x5	3.60	1.75	33x6.00	3.20	1.45
33x5	3.60	1.75	32x6.20	3.50	1.65
35x5	4.45	1.75	All Other Sizes		

DEALERS WANTED

Send only $1.00 deposit with each tire ordered. We ship balance C. O. D. Deduct 5 percent if cash in full accompanies order. Tires failing to give 12 months service will be replaced at half price.

YORK TIRE & RUBBER COMPANY, Dept. 1009
3855 Cottage Grove Ave. Chicago, Illinois

SELL CHANGEABLE SIGNS TO STORES

ROBINSON SOLD 18 SIGNS IN 4 HOURS

All stores want them, you make over $1.00 on every sale.

Flashy blue front, red border, black background, white letters, size 14x22, six lines, easel attachment, furnished with 260 letters and figures.

2 sample signs, postpaid . $ 1.00
1 dozen signs (1 free) 4.00
25 signs and sample case . 10.00

Retail price $1.50. You make 300% profit. Particulars Free.

NATIONAL SIGN SYSTEM, St. Louis, Mo.

Photography for PLEASURE or PROFIT

A fascinating hobby or a profitable business can now be yours. Prepare quickly at home under the personal guidance of leading experts in the fine art of photography. No experience necessary. Full or spare time. Many earn while learning. Our thorough studio method also qualifies you to fill a well paying position upon graduation. Send coupon now for FREE booklet, *Opportunities in Modern Photography.*

AMERICAN SCHOOL OF PHOTOGRAPHY
3601 Michigan Avenue Dept. 2054 Chicago, Ill.

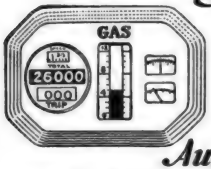
Send FREE booklet, *Opportunities in Modern Photography*, and full information.

Name .....

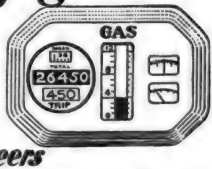
Address .....

City ..... State .....

450 MILES
on a gallon of gas



startling statement of famous Automotive Engineers



How to increase gasoline mileage has been a problem that Automotive Engineers have been trying for years to solve Recently a world famous engineer made the statement that the energy produced by burning a gallon of gasoline would run an auto a distance of 450 miles. Other well known authorities go on record as saying that eventually it may be possible to get over four times as much out of gasoline as in the past.

Amazing Whirlwind Device Saving Millions of Gallons of Gas for Auto Owners

The Whirlwind Carbureting device embodies scientific features which conserves part of the gasoline that formerly went to waste.

Whirlwind users, reporting the results of their tests, are amazed at the results they are getting. Letters coming into the office tell of record mileages resulting in a saving of from 25 to 50 per cent in gas bills alone.

Mark H. Estes writes: "I was making 17 miles to the gallon on my Pontiac Coupe. Today, with the Whirlwind, I am making 33 3/10 miles to the gallon. Am I glad I put it on? I'll say so!"

M. J. Blaski: "I have had my Whirlwind for two years now and am getting 30 per cent more mileage. I drove my old Oakland 28,000 miles and did not touch the motor. The plugs are always clean and dry."

R. J. Tulp: "The Whirlwind increased the mileage on our Ford truck from 12 to 26 miles to the gallon and 25 per cent in speed. We placed another on a Willys-Knight and increased from 12 to 17 miles per gallon."

Arthur Grant: "I have an Oakland touring car that has been giving me 15 miles to the gallon average, but I can see a great difference with the Whirlwind, as it climbs the big hills on high and gives me better than 23 miles to the gallon of gas, which is better than 50 per cent saving in gas."

Car owners all over the world are saving money every day with the Whirlwind, besides having better operating motors. Think what this means on your own car. Figure up your savings—enough for a radio—a bank account—added pleasures. Why let the Oil Companies profit by your waste? Find out about this amazing little device that will pay for itself every few weeks in gas saving alone.

FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck or tractor. It's actually less work than changing your oil or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you will save.

SALESMEN AND DISTRIBUTORS WANTED

To Make up to $100.00 a Week and More

Whirlwind men are making big profits supplying this fast-selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer to workers. Full particulars sent on request. Just check the coupon.

WHIRLWIND MANUFACTURING CO.
Dept. 493-A, Station C. Milwaukee, Wis.

GUARANTEE

No matter what kind of a car you have—no matter how big a gas eater it is—the Whirlwind will save you money. We absolutely guarantee that the Whirlwind will more than save its cost in gasoline alone within thirty days, or the trial will cost you nothing. We invite you to test it at our risk and expense. You are to be the sole judge.

FREE OFFER COUPON

Whirlwind Manufacturing Co.
Dept. 493-A, Sta. C., Milwaukee, Wis.

Gentlemen: You may send me full particulars of your Whirlwind Carbureting device and tell me how I can get one free. This does not obligate me in any way whatever.

Name .....

Address .....

City ..... State.....

( ) Check here if you are interested in full or part time salesmen position.

See the World FREE!

Taste Romance *and* Adventure *In the* Far Lands *of the* Earth

How often **you've longed to see for yourself** the awe of Egypt's pyramids—the beauties of the gorgeous Mediterranean sunset—the squalor of China's ancient cities!

Spend a few years, or the rest of your life, tasting high adventure on the seven seas and in all the world's great ports—roving the earth's highways and byways! You can do it **FREE**—all your expenses paid—and earn a good salary besides!

Only one profession will carry you around the world at will, traveling like a gentleman, but that's the most interesting and pleasant work there is—Radio Operating! Easily and quickly learned, there's no other profession like it for the man who wants the experiences and pleasures of world-travel. Radio operators are needed —all sea-going ships like the one shown here must carry from one to half a dozen or more.

Take *a* Look Beyond *the* Skyline *Without a* Penny's *Expense*

Radio operators aboard ocean liners live luxuriously—they rank as officers of the ship. Meals, a private cabin, all other living needs are furnished free, and besides the operator draws a good salary. You can learn quickly and easily at home in your spare time to be a Radio operator through our practical training methods. Take a look at the **FREE BOOK** which tells how—mail coupon below.

This U. S. Government-recognized school has been training successful operators since 1914. Our graduates are all over the world. We maintain an Employment Department to help find you or your own ship. The famous **NACOMETER**, a patented home code teacher, given our students, is recognized as the best and easiest way to learn the Radio code at home. A few short months, with the aid of the famous Nacometer and our quick home training, and you too can be a fully qualified Radio operator, sitting in your cabin like the one shown above, bound out for Liverpool or Nagasaki!

Read the Free Book that tells all about this fascinating profession and our practical Government-recognized methods of training you for it. Send coupon **TODAY**—no obligation. Special tuition offer now on, includes the Nacometer, famous code teaching machine. Find out what Radio offers you. Act at once. Mail the Coupon.

NATIONAL RADIO INSTITUTE
Dept. 1DNA WASHINGTON, D. C.

SPECIAL OFFER COUPON

National Radio Institute,
Dept. 1 DNA, Washington, D. C.

Gentlemen: Without obligating me in any way send me your free book and information about your Nacometer, the Home Code teaching machine given with your course.

Name .....

Address .....

Occupation .....

TEAR GAS FOUNTAIN PEN GUN!

100% Protection—*No Injury*

Amazing Invention. Has Size, Shape and Appearance of a Fountain Pen—**BUT—it shoots TEAR GAS.** A safe, effective substitute for dangerous firearms. Just point it—release tear gas instantly—protect a crowd or Blinding TEAR GAS momentarily stops, blinds and incapacitates the most vicious **Man or Beast.** No permanent injury. Criminals, Morons, Thugs fear Tear Gas more than bullets. Needed in Stores, Banks, Theatres, Homes everywhere to protect life and property. No skill required. Ideal protector for Motorists and Women. Shoots far enough so as not to affect user. Uses same Tear Gas Shells as **Official Police Equipment.** Precision built. **Not a Toy.**

AGENTS: Here is the Gun Sell \$3 LIKE Hot Cakes—Sensation of the year. Quick repeat orders. Big profits. Everyone wants one. Make up to **$3.00 daily.** Make an amazing demonstration that rolls in the money. Write Today for Sample and Demonstrating Outfit (*Retail value \$5.00*). **Not Sent C. O. D.**

LACHRYTE CO., P.O. Box 1719-C-100 CHICAGO, ILL., U.S.A.

Will Grow Your Hair Or Cost Nothing

Before: Jack Slavin At 45

You all know Jack Slavin, formerly Middleweight Champion Boxer of Australia and America. He's now 65, but when he was bald. See uncovered photos at sides.

When he was touring Asia the Sultan of Jahore introduced him to a Hindu Prince who, in jest, attempted to pull the few straggling hairs that remained at his temples. Jack was angry, and to appease his anger the Prince handed him a formula, saying: "Here, this will grow your d.....hair." Imagine his delight when it DID.

He has used this formula and treatment for 14 years with success on thousands of bald heads.

It is guaranteed to grow hair on your head, stop falling hair, eliminate dandruff and relieve itching scalp, or your money will be refunded—every cent of it.

There is no need for you to suffer from baldness any more. Send NOW for **free information.** Sent in plain sealed wrapper without obligation.

After: Jack Slavin At 65

SLAVIN INST., Dept. 80, 508 S. Dearborn St., Chicago, Ill.

BOYS! Make Big Money

BUILD BIRD HOUSES

Here's a real money maker. With my simple instructions any boy can build and erect Grandpa Bird Houses. They sell at $2 to $97.50 each. $2000 worth sold in Oak Park, Ill., in a year. Send $1 for my big collection of work shop plans for boys who want to have fun and make money building my famous bird houses. Valuable information about song birds and tips and advice on making sales included Free.

GEO. J. BREIDERT, 109 North Elmwood Ave., OAK PARK, ILL.

GOVT. POSITIONS

$35 TO $75 WEEKLY

MEN WOMEN

- Railway Mail Clerk
- P. O. Clerk
- P. O. Laborer
- File Clerk
- Matron
- General Clerk
- Chauffeur-Carrier
- Skilled Laborer
- Watchman
- Postmaster
- RFD Carrier
- Meat Inspector
- Special Agent
- Customs Insp.
- Steno-Typist
- Immigrant Insp.
- City Mail Carrier
- Border Patrol
- Typist
- Seamstress
- Steno-Secretary
- Auditor

AGE 18 TO 50

Instruction Bureau, Dept. 233, St. Louis, Mo.
Send me particulars about positions marked "X"—salaries, locations, opportunities, "How to Qualify", etc.

Name .....

Address .....

TRAVEL ON "UNCLE SAM'S" PAY ROLL

RAILWAY POSTAL CLERKS
$158 Month First Year
Raise to $225 Month

Many Other U. S. Government Jobs Open to Men and Boys 18 to 50

Post Office Clerks — City Mail Carriers — Rural Mail Carriers
Clerks—Customs and Internal Revenue Service
Customs Inspectors—Immigrant Inspectors

These are steady positions. Strikes, poor business conditions, lockouts or politics do not affect them. U. S. Government employees get their pay for full twelve months every year. There is no such thing as "Hard Times" in the U. S. Government Service.

ALLOWANCE FOR HOTEL EXPENSES

Railway Postal Clerks now get $1900 the first year, being paid on the first and fifteenth of each month, $79.16 each pay day. Their pay is increased $100 and $150 a year. The maximum is $2700 a year, $112.50 each pay day. They get extra allowance for hotel expenses when away from home.

PAID VACATIONS

Railway Postal Clerks, like all Government employees, are given a yearly vacation of 15 working days (about 18 days). When on runs they usually work 3 days and have 3 days off duty or in the same proportion. During this off duty and vacation, their pay continues just as though they were working. When they grow old, they are retired with a pension. As Railway Postal Clerks are continually traveling, they have an excellent chance to see the country. They are furnished with a railroad pass for official business.

City Mail Carriers—Post Office Clerks

Clerks and Carriers get $1700 the first year regular and automatically increase $100 a year to $2100 with further increase to $2300. They also have 15 days vacation. City residence is unnecessary.

What Will You Earn 5 Years from Now?

DO YOU EARN $1900 EVERY YEAR? HAVE YOU ANY ASSURANCE THAT A FEW YEARS FROM NOW YOU WILL GET $2700 OR MORE A YEAR, EVERY YEAR?

Get Free List of Positions

Fill out the coupon. Tear it off and mail it today—now, at once. DO IT NOW—This investment of two cents for a postage stamp may result in you getting a life U. S. Government Job.

MAIL COUPON TODAY

FRANKLIN INSTITUTE
Dept. A-302
ROCHESTER N. Y.

Rush to me entirely free of charge 32 page book with (1) a full description of the position checked below; (2) a list of U. S. Government Steady Jobs now obtainable; (3) Tell me how to get the position checked.

☐ Ry. Postal Clerk	($1900-$2700)
☐ Post Office Clerk	($1700-$2300)
☐ City Mail Carrier	($1700-$2100)
☐ Rural Mail Carrier	($2100-$3000)
☐ General Clerk—File Clerk	($1260-$2500)
☐ Inspector of Customs	($2100 up)
☐ Immigrant Inspector	($2100-$2900)

Name .....

Address .....

Use This Coupon Before You Mislay It—Write or Print Plainly

"I *had* to make more money—for *her*"

"Three weeks after I met Ann we were engaged. It was when we began talking about rents and furniture and such things that I woke up.

"I'd been drifting along in a routine office job for years. I knew I didn't deserve a raise. And yet I *had* to make more money—a lot of it—and quick. It was Ann herself who suggested the International Correspondence Schools. She believed in me so thoroughly that she made me believe in myself, and I started studying the I. C. S. course in Accounting in my spare time.

"That was a year and a half ago. We've been married six months and I just got my third promotion. I'm head of the cost accounting department now. My I. C. S. course was the finest investment I ever made."

Are you one of the thousands of young men who need a bigger salary and a better job? In an hour a day of your spare time you can secure the training that will bring you advancement. Without cost, without obligation, find out what the I. C. S. can do for you. Mark and mail this coupon **now!**

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 2316-K, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject *before* which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect	☐ Automobile Mechanic
☐ Architectural Draftsman	☐ Plumbing ☐ Steam Fitting
☐ Building Estimating	☐ Heating ☐ Ventilation
☐ Wood Millworking	☐ Sheet Metal Worker
☐ Contractor and Builder	☐ Steam Engineer
☐ Structural Draftsman	☐ Steam Electric Engineer
☐ Structural Engineer	☐ Civil Engineer
☐ Electric Wiring	☐ Surveying and Mapping
☐ Electrical Engineer	☐ Refrigeration
☐ Electric Lighting	☐ R. R. Locomotives
☐ Welding, Electric and Gas	☐ R. R. Section Foreman
☐ Reading Shop Blueprints	☐ R. R. Bridge and Building Foreman
☐ Telegraph Engineer	☐ Air Brakes ☐ Train Operation
☐ Telephone Work	☐ Highway Engineering
☐ Mechanical Engineer	☐ Chemistry ☐ Pharmacy
☐ Mechanical Draftsman	☐ Coal Mining Engineer
☐ Machinist ☐ Toolmaker	☐ Navigation ☐ Boilermaker
☐ Patternmaker	☐ Textile Overseer or Supt.
☐ Pipefitter ☐ Tinsmith	☐ Cotton Manufacturing
☐ Bridge Engineer	☐ Woolen Manufacturing
☐ Bridge and Building Foreman	☐ Agriculture ☐ Fruit Growing
☐ Gas Engines ☐ Diesel Engines	☐ Poultry Farming ☐ Radio
☐ Aviation Engines	☐ Marine Engineer

BUSINESS TRAINING COURSES

☐ Business Management	☐ Business Correspondence
☐ Office Management	☐ Lettering Cards ☐ Signs
☐ Industrial Management	☐ Stenography and Typing
☐ Personnel Management	☐ Complete Commercial
☐ Traffic Management	☐ Civil Service ☐ Mail Carrier
☐ Accountancy (Not Accountant)	☐ Railway Mail Clerk
☐ C. P. Accountant	☐ Grade School Subjects
☐ Bookkeeping	☐ High School Subjects
☐ Secretarial Work	☐ College Preparatory
☐ Spanish ☐ French	☐ Illustrating ☐ Cartooning
☐ Salesmanship ☐ Advertising	☐ Lumber Dealer

Name ..... Age .....

Address .....

City ..... State .....

Occupation .....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

---

New Way to Learn Drafting.

. . . TOOL DESIGNING and Production Engineering!

You can't learn drafting, tool designing and engineering by merely reading books or copying drawings. We give you actual work to do, so that you can learn by practical experience. When you graduate, you start right in as a high-salaried expert, with a college degree. Our practical engineering course will enable you to step into a high place in industry. Day and evening classes—also personal service training course by mail. Old, established college. Write today for FREE Book giving full information.

DETROIT COLLEGE of APPLIED SCIENCE
8207 Woodward Ave. Detroit, Mich.

FREE BOOK

NO MORE BIG TIRE BILLS!

GOODYEAR · FISK · Firestone · U.S. AND OTHER TIRES

At ¼ Regular Prices

Tires You Know and Prefer AT NEW LOW PRICES!

Here is your chance to get fastest and most reliable rubber company to deliver standard and latest model tires. Actual tests on the terrific roads in the country prove that our standard brand, Gros Jeaner 10 to 60 per cent more service. A trial order will convince you.

BUY 12 MONTHS SERVICE SAVE NOW GUARANTEED MONEY

BALLOON Tires		Reg. CORD Tires	
Size	Rim Tires Tubes	Size	Tires Tubes
29x4.40-21"	$2.45 $1.10	28x4.75-19"	$2.95 $1.10
29x4.50-20"	2.45 1.10	29x4.50-20"	2.95 1.10
28x4.75-19"	2.95 1.10	28x5.00-19"	3.25 1.25
30x4.95-21"	2.95 1.10	30x5.00-21"	3.25 1.25
29x5.00-19"	2.95 1.10	29x5.00-20"	3.25 1.25
28x5.25-18"	3.01 1.25	28x5.25-18"	3.30 1.25
29x5.25-19"	3.01 1.25	29x5.25-19"	3.30 1.25
31x5.25-21"	3.01 1.25	31x5.25-21"	3.30 1.25
30x5.77-20"	3.01 1.25	30x5.77-20"	3.30 1.25
31x6.00-19"	3.29 1.40	30x6 3.40 1.35	
30x6.00-20"	3.29 1.40	32x6 3.40 1.35	
32x6.00-21"	3.29 1.40	33x6 3.44 1.35	
31x6.50-21"	3.68 1.50	All Other Sizes	

DEALERS WANTED

All Tubes New—Guaranteed First Quality

Send only $1.00 deposit with each tire ordered, balance C. O. D. If you send cash in full deduct 5 per cent. Orders guaranteed or your's service or replacement at half price.

MIDLAND TIRE & RUBBER COMPANY
Dept. 923, 1000-10 W. Sixty-Third Street Chicago

GIANT TELESCOPE

$1.75

5 SECTIONS—24 IN. LONG

See Miles Away! Distant people and objects seem close. Over 3 ft. long, brass bound. Made in Europe. Quite, of fun. Thousands pleased.

Send No Money! On arrival pay Postman special price, only $1.75, plus postage. Two for $3.25. (Or send price and we pay postage.) Satisfaction guaranteed or money back. Send today.

Bargain House, 427 Randolph St., Dept. 1-61, Chicago

FREE With Order
Strong leatherette Carrying Case and Solar Eye Piece to view the sun.

Learn to Dance

This New Easy Way

You can learn all the modern dances—the latest Tango steps, the new Fox Trots, directly Waltzes, smart Collegiate Steps and the popular Rockety Steps at home easily and quickly. New chart method makes dancing as easy as A-B-C. No music or partner required. Learn anywhere, any time. Win new popularity. Be in demand at parties. Same course of lessons would cost $20 if taken privately.

Send No Money

Just send your name and address. We'll ship the complete course—285 pages—54 illustrations—without one cent in advance. When package arrives, hand postman only $1.98 plus delivery charges, and this wonderful course is yours. Try for 5 days. Money back if not delighted. Send your name NOW. Catalog Free.

FRANKLIN PUB. CO., 800 N. Clark Street, Dept. A-312, Chicago

Choose the Books that Will Raise *Your* Pay!

Henley's books are used in more than 200 Schools and Colleges

AVIATION

☐ **Aviation Engine Examiner**

By Major Victor W. Pagé. Aviation engines explained in simple questions and answers. Prepares you for job as aircraft engine mechanic; valuable to pilots and students. Describes all types aviation engines, parts and construction, principles of operation, with instructions for engine inspection, installation, trouble shooting, overhauling and repair. Compact, condensed, simplified 100 pages, 250 illustrations. **Price, $3.00.**

☐ **A. B. C. of Gliding and Sailflying**

A brand new book on motorless flying. Explains everything about this popular sport; all types of Gliders and Sailplanes, construction, control and launching; principles of gliding, soaring, air currents, etc. Instructions for building simple Glider, with WORKING DRAWINGS. How to form a Glider Club, etc 200 pages, 70 illustrations. **Price, Paper Binding, $1.50; Cloth, $2.00.**

☐ **Modern Aircraft**

By Major Victor W. Pagé. Covers all types of American and foreign airships, airplanes, and engines, design and construction, with complete instructions for operation and maintenance. Nineteen practical chapters. Used in 200 schools. 855 pages, 400 illustrations, 23 tables. **Price $5.00.**

☐ **Modern Aviation Engines**

By Major Victor W. Pagé. Most complete treatise on all types of aircraft motors ever published. Describes, explains, illustrates **every type of aircraft motor**—installation, repairs, maintenance. Two great volumes, 1000 pages, 500 illustrations in each. Vol. 1 covers principles of aviation engines, engine parts and functions, construction, trouble shooting, etc. Vol. 2 gives detailed descriptions of all leading makes of airplane and airship engines of today.
Price per volume, $5.00; both volumes, $9.00.

☐ **Aerial Navigation and Meteorology**

By Captain Lewis A. Yancey. Tells how to fly course with precision and assurance. 350 pages, 102 illustrations and colored plates. Solved problems and examples for practice. **Price $4.00.**

☐ **Everybody's Aviation Guide**

By Major Victor W. Pagé. 600 Questions and Answers that teach aviation from the beginning. Complete information necessary for U. S. Government license. Construction of airplanes—parts—functions —equilibrium—control, etc. 256 pages, 140 illustrations. **Price $2.00.**

☐ **A. B. C. of Aviation**

By Major Victor W. Pagé. A clearly written book giving you a basic knowledge of aircraft and why they fly. An ideal book for everyone approaching study of aviation. 160 pages. 150 illustrations. **Price $1.**

ELECTRICITY

☐ **Electricity for Beginners**

By E. H. Thomas. Just the book for those beginning study of Electricity. Written by an experienced instructor, and containing 196 pages, fully illustrated. 60 chapters, including circuits, resistance, pressure, horsepower, kilowatt, magneto-generator, dynamo, generators and motors, electric light, telegraph, telephone, electro-plating, etc. Used in many high schools. **Price $1.50.**

☐ **House Wiring**

By Thos. W. Poppe, Electric Engineer. Revised, enlarged and brought up to date by **Harold P. Strand,** Master Electrician-Contractor. **Complete** in every detail and in accordance with the 1930 National Electrical Code. Profusely illustrated. Plans and layout of work in old and new construction —Locating outlets—Sizes of wire—Armored cable wiring—New type AIC Cable—Running the cables—Testing—Meter board construction—Grounding—Bell wiring—Burglar alarm wiring—Telephone wiring—etc., etc. 285 pages, 171 Illustrations. Pocket size. **Price $1.00.**

☐ **Arithmetic of Electricity**

By Prof. T. O'Conor Sloane. Reduces all electrical calculations to a series of simple rules, using only common arithmetic. Every rule illustrated by practical problems and detailed solutions. Does away with need for algebra to understand electrical mathematics. Everyone interested in electricity needs this new book. Revised and enlarged **23rd edition.** 230 pages. **$1.50.**

☐ **Modern Diesel Engine Practice**

By Orville Adams. An indispensable guide for every Owner and Operator, covering every basic fact requisite to a complete understanding of Diesel Engine Theory and Operation. This book combines in one volume, a text for study and reference, and a practical manual on operation and repair. Written by a recognized authority on Modern Diesel Engineering. Includes information on the Modern Packard Diesel Aircraft Engine. 600 pages, 400 engravings. **Price $6.00 net.** (Special detailed circular sent on request.)

AUTOS

☐ **Modern Gasoline Automobile**

By Pagé. Everything you want to know about automobiles in this NEW EDITION of a famous work. Complete, up-to-date, authoritative, clearly and simply written. Care of your car, trouble prevention, trouble detection, repairs. An encyclopedia in one volume. 1146 pages, 1000 illustrations. **Price $5.00.** (With special 23x38-inch Trouble Shooting Chart **$5.25.**)

☐ **Ford Model "A" Car**

By Major V. W. Pagé. The book you have been waiting for! Explains the new Ford inside and out, construction, operation and repairs. Every part described and illustrated. All repair processes illustrated and explained by more than 100 specially posed photographs. 585 pages, 252 Diagrams and Pictures. **Price $2.00** (With special 23x38-inch Ford "A" Trouble Shooting Chart **$2.25**)

☐ **Ford Model "T" Car**

By Major V. W. Pagé. Including Fordson Farm Tractor. Most complete book on construction, operation and repair 455 pages, 170 special Engravings and Photos. **Price $2.00.** (With special 23x38-in. Trouble Shooting Chart, showing detailed construction and repairs. **$2.25.**)

☐ **Automobile Welding with the Oxy-Acetylene Flame**

By M. Keith Dunham. Clearly explains everything about oxy-acetylene welding for Garage, Service Stations, Auto owners, Machine shops, Tin shops, 167 pages, fully illustrated. **Price $1.50.**

SEND NO MONEY — CHECK BOOKS WANTED

Use this page as your Order Form. Tear out and mail. The books you want will come to you ON APPROVAL. Pay postman on delivery. **Your money back if not satisfied.**

NORMAN W. HENLEY PUB. CO., Dept. MM-431
2 West 45th Street, New York, N. Y.

Please send me the book, or books, checked on this page. I enclose no money but will deposit the price, plus postage, with the postman on delivery. My money back if I return books within 5 days after receipt.

Use This Page as Your Order Blank.
Tear Out and Mail to Us.

Name .....

Address .....

Town ..... State .....
(Outside of U. S. cash with order)

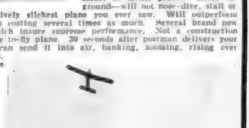
☐ **FREE CATALOG** If you don't find the book you want on this page, send for FREE Catalog of famous Henley books. More than 50 different subjects: Radio, Machine Shop Practice, Heating, Plumbing, Boats, Chemistry, Railroading, etc.

The Famous White Wasp
MODEL AIRPLANE

FREE

MADE BY KINGSBURY

Here's the new White Wasp, made especially for us by Kingsbury — world's leading maker of model planes. Rises off ground—will not nose-dive, stall or spin. Positively slickest plane you ever saw. Will outperform most planes costing several times as much. Several brand new features which insure supreme performance. Not a construction set—a ready to-fly plane. 30 seconds after postman delivers your plane you can send it into air, banking, zooming, rising over housetops. Look at this picture!



ACTUAL PHOTO OF WHITE WASP IN FLIGHT

THRILLING STORIES 12 thrilling issues!

The Open Road for Boys Magazine is a fifty-page, monthly magazine crammed with thrilling, breath-taking stories of high adventure, aviation, deep mystery and suspense. 200,000 readers. Regular subscription price to Open Road for Boys Magazine alone is $1.00 a year. Fill out and send the coupon below, with $1.00 and we'll send you The Open Road for Boys Magazine for one year and we'll rush a White Wasp Plane to you FREE of all charge. This is a great offer. Send coupon today.

USE COUPON

Pilot Heroes—Open Road for Boys
120 Newbury Street, Boston, Mass.

Canadian Postage 25c Extra
Foreign, 50c Extra

Friend Pilot: Gosh, yes! Here's my dollar. Put me down for a whole year for Open Road for Boys Magazine and rush me a White Wasp Plane immediately.

Name .....
Street & Number .....
City or Town ..... State .....

GET YOURS RIGHT AWAY

ANDY'S SHOP MAIL BOX

(Continued from page 34)

hour then all the firsts are theirs, providing they have or are good drivers, which I am not and can't find.

I would like to hear from some of the boys up in Virginia around Norfolk and Richmond. I know all the boys down south and have driven my car against a fine bunch of sports.

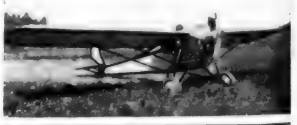
Now listen, Andy, I am sending you a photo of my car which I designed and built. If there are any questions which you want to ask me about dirt track racing or anything pertaining to my car, just shoot them at me.

I am sure that automobile racing is the greatest sport in the world, so let's get busy and see what we can get started. Here's hoping that the boys get all their holes drilled right and that everything fits.

Yours truly,
C. M. WEBB.

Mister Webb, you're going to find out pronto what you can get started, for every racing bug in the country is going to write to you for all the dope and gossip. I only hope they have enough heart to enclose a stamped envelope, but you're going to have to dig down for the paper and ink. Moral—Don't get anything printed in this here column unless you like to answer letters.

And while we're on the subject of building dirt track racers, I have a few lines to throw to the relief of Ray Kuns, who has been swamped with mail requesting all the dope on building racers. His mail has been so heavy of late that he has found it impossible to keep up with it, especially as every answer had to be the length of a small book to fill the bill. Mr. Kuns has just completed a treatise covering the entire subject of building dirt track racers, which he offers for one buck. This complete manual for those who would burn up the dirt at the county fair is



This is a shot of Les Long's Longster. Les informs us that you should use a 6' 6" prop with a 3' 2" pitch instead of the 6' 4" stick specified if you want to get better speed from your home built ship.

(Continued on page 46)

. . . when you too can fly the famous Heath Parasol
. . . $975 complete. Or build it yourself for only $199.

Another great flying season is here! And with it comes a challenge to you. Are you going to sit back and watch others fly? Or are you, too, going to enjoy the countless flying hours offered by the Heath Parasol—the safest, most economical sport plane ever built?

If you've ever seen this great little plane—you'll know it is built for you to fly. Not even the largest planes are so easy to fly—so inherently safe and dependable. Experienced pilots find it so remarkably stable they actually land it with hands off the controls.

Great Convenience Features

No other plane offers the great convenience features of the Heath Parasol. It requires no airport as it lands on any field or even a highway. Nor does it require any hangar. For with wings mounted on the sides it takes no more space than a car, and a country barn or a city garage provides excellent storage facilities.

What It Will Do

Just picture yourself flying this great little plane over a 400 mile cruising radius! Flying at a top speed of 85 miles per hour! With a safe load of 300 pounds! And able to attain a ceiling of 18,000 feet. Then you'll get an idea of the great flying hours this stable plane offers you.

QUICK FACTS

1. A low wing or center wing plane as well as a Parasol type can be built from the standard Heath construction set by a simple adjustment of the wings.
2. 85 miles per hour top speed.
3. 400 mile cruising radius.
4. 40 miles per gallon of gas.
5. 300 pound safe carrying load.
6. Winner for 5 consecutive years of light plane events at National Air Races.

Low Flying Cost

Consider also how little it costs to fly the Heath Parasol! Complete, ready to fly—the plane costs only $975. Or you can build it from clear, detailed plans for only $199. Parts may be purchased in 11 convenient progressive groups. $12 brings the first shipment. And the complete flying cost including gas, oil, storage, etc., is actually less than 1 cent a mile!

No Technical Training Necessary

Why delay another day? Heath plans are so clear that technical training is entirely unnecessary to follow them. They are accompanied with complete detailed instruction sheets—remarkably easy to understand. Let us tell you more about America's most popular sport plane. 10 cents in stamps or coin brings large illustrated booklet. Mail the coupon below today.

A RECENT BUILDER WRITES:
". . . . my Parasol outperforms any ship flying out of our airport—4900 feet above sea level."

HEATH
AIRCRAFT CORP. CHICAGO

Heath Aircraft Corp., Dept. M. 431
1721-9 Sedgwick St., Chicago, Ill.

Enclosed find 10 cents for postage. Without obligation—please send me your large illustrated booklet. I am particularly interested in:

☐ The complete Parasol—ready to fly at $975.

☐ Building the Parasol for $199

Name

Address

City State

TELEPHONY

WORLDS GREATEST HANDBOOK

Sent FREE!

Would you like a well-paid position as Telephone expert? Only a few minutes a day with this wonder-book will prepare you to break into this fascinating field in less than a year. New edition includes "automatic" machine switching "manual" switchboards, long-distance and cable lines,—every engineering, operating and business detail of the great telephone industry.

For Beginners and Experts

Written in simple language for the beginner by McMeen and Miller with help of Model Engineers of American Telephone & Telegraph Co. In daily use by hundreds of electrical and telephone engineers as a dependable reference and guidebook. Has helped thousands of men employed in telephone work smash ahead to better-paid positions. A year's consulting membership in American Technical Society free if you mail coupon at once for book on approval. Reduced price, easy payments.

943 Pages

6 great volumes in one. Revised edition with 340 chapters and hundreds of illustrations. De Luxe gold-stamped binding. Big saving in price in handy single volume.

AMERICAN TECHNICAL SOCIETY
Dept. T-4320 Drexel Ave. & 58th St., Chicago

American Technical Society,
Dept. T-4320 Drexel Ave. & 58th St., Chicago
Please send for 10 days FREE TRIAL and without obligation to me, McMeen and Miller's great hand-book on "Telephony." If I decide to keep it I will pay $2 after 10 days, then $2 a month until your special advertising price of $6 is paid.

Name .....

Address .....

Employer's Name .....

Employer's Address .....

ELECTRIC Books Sent Free

On Approval! Only 15 minutes a day with these wonder books will prepare you for a good electrical job in less than a year. A complete electrical course from elementary electricity through electrical subjects used by experts but written in non-technical language so that anybody can understand.

AC Radio Included

For Beginners and Experts

Written so you can understand every word. Printed on fine paper and bound in DeLuxe flexible binding. 8 Volumes 3000 pages, 3200 illustrations.

Big Field! Big Demand! Big Pay!

Men who understand electricity are urgently needed right now in thousands of industries, Auto, airplanes, machine shops—practically every industry depends on electricity and men who know this subject make big money. Fascinating work, fascinating work, easy to learn and the more quickly with these books. Send coupon for a set for free examination and see for yourself.

Free! *A year's consulting membership in the American Technical Society also goes free to all readers of this famous reference of electricity. Money say. That's worth more than cost of books.*

AMERICAN TECHNICAL SOC., Dept. C-4320, Drexel at 58th St., Chicago

Electricity—the biggest industry in the world—continues to grow by leaps and bounds and offers better jobs, bigger salaries and brighter future than other fields. Send today on this free offer. Your name and address and that of your employer or other reference is all that is necessary. No money. Examine these wonder books carefully and get, without cost, outline for organized study, guide questions and consulting privilege with experts—all extra till your books arrive. Mail coupon now.

American Technical Soc., Dept. C-4320, Drexel at 58th St., Chicago

Send for 10 days' free use, 8 volume set of Electrical Engineering. In return for sending this coupon promptly, send absolutely free, certificate of membership in the American Technical Society entitling me to free consulting privileges for one year. I will pay the few cents delivery charges on the books. If I wish I may return them in 10 days and owe you nothing, but if I keep them I will send $2.00 after 10 days, then $2.00 a month until your special sale price of only $34.80 is paid. You are also to include extra book, "A. C. Radio."

Name .....

Address .....

City ..... State.....

Employed by .....

Address .....

It's a WOW

FREE!

This 20" Curtiss Robin Fly? Oh boy, and how. Build one now.

12 page folder describes U. S. Falcon, U. S. Barling, U. S. Boeing P-12 B, U. S. Lockheed Sirius—and others.

SEND 10c FOR 56 PAGE CATALOGUE
26 MODELS, 1000 PARTS

U·S·MODEL AIRCRAFT CORP.
397 BRIDGE ST. BROOKLYN, N.Y.

don't WORRY

Why put up with years of needless discomfort and worry? Try a Brooks Automatic Air Cushion. This marvelous appliance permits the opening to close, yet holds rupture securely, comfortably — day and night. Thousands report amazing results. Light, neat-fitting. No hard pads, metal girdle or parts to chafe or gouge. Patented in U. S. and 13 foreign countries. Try one 10 DAYS WITHOUT A PENNY'S RISK. You'll be delighted. Free book on Rupture and convincing facts mailed postpaid in plain sealed envelope. Address

RUPTURE

BROOKS APPLIANCE CO., 146C State St., Marshall, Mich.

20 GIANT ZINNIAS 10c

Send for **World's Greatest Collection Giant Zinnias**—famous for size and beautiful colors—easy to grow anywhere and bloom from early summer until frost. This collection includes **20 gorgeous colors**, as follows:

Bright Rose	**Purple**	**Shrimp Pink**
Burnt Orange	**Sulphur Yellow**	**Cardinal**
Deep Flesh	**Salmon Rose**	**Canary Yellow**
Lavender	**Buttercup**	**Blush Pink**
Buff	**Cream**	**Violet**
Ruby Red	**Crimson**	**White**
Orange	**Deep Rose**	**And Others**

These **Seeds—20 Colors** in packet (over 100 seeds), **10c; 3 pkts., 25c; 7 pkts., $1.00.**

Spring Catalog (233 varieties in natural colors) of **Seeds, Bulbs, Shrubs, Roses and Perennials,** mailed with every order or **10c** coupon on request.

F. B. MILLS, Seed Grower, Box 77, Rose Hill, N. Y.

1931 NEW LOW PRICES U.S. Firestone GOOD/YEAR FISK, and other Tires

GUARANTEED

These well known brands only slightly used are taken from cars recently equipped with Super Service Station Host Tires. Every tire is fully guaranteed.

We have such great confidence in these tires that we guarantee them for 15,000 miles against blowouts, broken cords or defects. Any tire failing to deliver this mileage will be replaced at half price. This great 15,000 mile guarantee is backed by the reputation of over 40 years in business. YOU RISK NO MONEY. If any tire you order is not satisfactory upon delivery return it to us at once for full refund.

15,000 MILES GUARANTEED

DEALERS WANTED

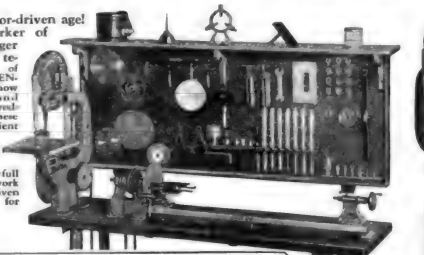
High Pressure Cords	BALLOON CORDS					
Size	Tires	Tubes	Size	Tires	Tubes
29x4.40-21	$2.35	$1.00	29x4.40	$2.30	$1.00
30x4½	2.35	1.00	29x4.50	2.40	1.00
28x4	2.35	1.00	29x4.75	2.40	1.00
29x4	2.35	1.15	30x4.50	2.90	1.00
30x4	2.50	1.15	30x4.75	2.90	1.00
29x4½	2.50	1.15	30x5.00	2.90	1.00
30x4½	2.50	1.15	28x5.25	2.95	1.00
29x4½	2.60	1.15	29x5.25	2.95	1.00
30x4½	2.60	1.15	30x5.25	2.95	1.00
29x5	2.60	1.75	29x5.50	3.25	1.00
30x5	2.60	1.75	30x5.50	3.25	1.00
28x4.75-19	2.60	1.75	28x6.00	3.35	1.00

All tubes new—guaranteed first quality. Send only $1.00 deposit for each tire, balance C. O. D. Deduct 5 per cent if you send full price with order.

AMERICAN TIRE COMPANY, Dept. 724-E
5339 South Michigan Avenue Chicago, Ill.

"*Delta*" Motor-Driven Units..the Modern Way of Woodworking

This is a motor-driven age! The woodworker of today no longer endures the tedious drudgery of handwork. He ENJOYS his work now—saves time and turns out better products—by using these compact and efficient machines, so moderately priced as to be within the reach of all. For full or spare-time work Delta motor-driven tools soon pay for themselves.



"DELTA" Band Saw has many exclusive features.

"DELTA" De Luxe Workshop, the last word in motor-driven workshops. Includes a 4-speed Lathe, Band Saw, Circular Saw, Jointer.

"DELTA" Boring and Routing Attachment—Revolutionizes woodworking. Makes child's play out of difficult boring, routing, mortising. Convenient, easy to operate. Furnished, separately if desired.

DELTA EFFICIENCY

Every Delta woodworking machine is built up to this standard—it must perform its work *efficiently, quickly,* and *conveniently.* There are no hidden "bugs" in Delta Tools, no awkward, time-consuming operations, no bothersome dismantlings. Instead, there are thoroughly practical design, quality in workmanship and materials throughout (even where it cannot be seen), and numerous exclusive constructional features. That's why woodworkers everywhere say that Delta gives the most machine value for the dollar. That's why Delta owners are enthusiastic Delta boosters.

10 Day Trial—Easy Terms

Send coupon today for free illustrated literature describing the new 1931 "Delta" line. Also details of 10-Day Trial Offer and Easy Payment Plans.

DELTA SPECIALTY COMPANY
Division of DELTA MFG. CO.
3775 Holton St. Dept. N-433 Milwaukee, Wis.

"DELTA" COMBINATION JOINTER AND CIRCULAR SAW—Complete, on sturdy stand of convenient height. Jointer and Circular Saw can be operated separately or together without interference. This "DELTA" Unit is furnished with or without motor. Both the Jointer and Circular Saw can be secured as separate, individual units if desired.

Delta Specialty Co., 3775 Holton Street Milwaukee, Wis., Dept. N-433

Gentlemen: Please send me FREE illustrated literature describing 1931 "Delta" line and details of 10-day Trial Offer and Easy Payment Plan.

Name.....

Address..... Age.....

EXPO Watch Camera

Complete Outfit, $5.00. Send $1 with order. Pay postman the balance upon receipt of outfit.

Send Only $1

with order for COMPLETE OUTFIT

Here's the greatest little camera made! A novel and valuable possession that will give you loads of fun for years to come. Fits right into your vest pocket. **You can take pictures without being detected.** Looks exactly like a watch, only it is a trifle larger. Weighs but 3 ounces. Pictures are taken through the stem, where the rapid-fire little lens is located. A well made and finely finished instrument.

Takes pictures 5/8" of an inch (sharp negatives), which may be enlarged to 2½x3½ inch size. Loads in daylight with a film of 20 exposures. Shutter has time and instantaneous speeds. Some of the leading newspapers of the country have scored important news "beats" with the aid of the Expo Watch Camera.

Complete outfit includes camera, with brilliant view finder, and 20 exposure film. Total price only $5.00. Send only $1.00 with order. Pay postman the balance upon receipt of outfit, plus few cents postage. Don't delay—send $1 today!

FREE BARGAIN BOOK

Headquarters for everything photographic. New and used. Send for our FREE Bargain Book listing used bargains. No obligation. Write today!

CENTRAL CAMERA CO.

Dept. MMe. E-4, 230 S. Wabash Ave. Chicago, Ill.

For Modeling

You Can Plane It Carve It

For Repairing

You Can Turn It Finish It

NEWS! Amazing new kind of wood that handles like putty, hardens into wood, looks like wood . . . Plastic Wood you can plane, turn, carve . . . Plastic Wood that expertly mends a thousand things and makes anything you can make with natural wood or modeling clay . . . That's its name . . . PLASTIC WOOD. Sold in cans and tubes, in 9 colors, by all paint and hardware stores. Just mail coupon for big 48-page, profusely illustrated book that shows the many uses for this new kind of wood you just mould with your hands. SENT FREE!

BIG 48-PAGE BOOK FREE

THE A. S. BOYLE CO., Dept. 4-MM-18
Cincinnati, Ohio

Send me—free—Big Book of Uses for Plastic Wood.

Name .....

Street .....

City ..... State .....

ANDY'S SHOP MAIL BOX

(Continued from page 42)

called AUTOMOBILE RACING. It tells you what to do, where to buy it, and how to break into the game. If you write for this dope from Ray he'll try to sell you a copy of his treatise, so you might as well buy it in the first place.

A Great Airman Passes

The late Ed Heath in the cockpit of his glider.

EDWARD B. HEATH, pioneer in aviation and one of the country's foremost designers of light planes, died February 1 as he would have wished to die—at the controls of a new type airplane he was striving to perfect.

The airplane, an experimental ship of the low wing type, the first of its kind which he had built, developed a weakness in one of the wing struts, while he was testing it, and the wing collapsed at a height of 1500 feet.

Mr. Heath was familiar to MODERN MECHANICS AND INVENTIONS readers as designer of the Heath Parasol, the popular light plane whose plans were published in this magazine some months ago. The plane in which he was killed embodied new principles with which he was experimenting to determine whether they could pass the rigid tests to which he subjected everything which bore his name.

FREE To Men Past 40

Amazing New Facts About The Misunderstood Subject of Rejuvenation!

A WELL-KNOWN scientist's new book about old age reveals facts, which, to many men, will be amazing. Did you know that two-thirds of all men past middle age are said to have a certain seldom mentioned disorder? Do you know the frequent cause of this decline in health?

Common Old-Age Symptoms

Medical men know this condition as hypertrophy of the prostate gland. Science now reveals that this swollen gland—painless in itself—not only often cheats men of health, but also bears on the bladder and is often directly responsible for sciatica, backache, pains in the legs and feet, frequent nightly rising, and dizziness, denoting high blood pressure. When allowed to run on it is frequently the cause of the dreaded disease cystitis, a very severe bladder inflammation.

65% Have This Gland Disorder

Prostate trouble is now reached immediately by a new kind of home treatment—a new safe hygiene that goes directly to the gland itself, without drugs, medicines, massage, lessons, diet or the application of electricity. It is absolutely safe. 100,000 men have used it to restore the prostate gland to normal functioning. The principle involved in this treatment is recommended by practically all physicians in America. Amazing recoveries are made in seven days. Another grateful effect is usually the immediate disappearance of chronic constipation. Usually the entire body is toned up, as much of your youthful vigor is restored. These results are guaranteed. Either you feel ten years younger in seven days or the treatment costs nothing.

Send for FREE Book

If you have this gland trouble or if you have any of the symptoms mentioned above, you should not lose a day in writing for the scientist's free Book, "Why Men Are Old at 40." It will enable you to ask yourself certain frank questions that reveal your true condition. Every man past 40 should make this test, as insidious prostate disorder often leads to surgery. This book is absolutely free, but mail coupon immediately, as the edition is limited. Address

THE ELECTRO THERMAL CO.
3840 Morris Ave. Steubenville, Ohio

If you live West of the Rockies, address The Electro Thermal Co., 303 Van Nuys Building, Dept. 38-T, Los Angeles, Calif. In Canada, address The Electro Thermal Co., Desk 38-T, 53 Yonge St., Toronto, Can.

THE ELECTRO THERMAL COMPANY,
3840 Morris Ave., Steubenville, Ohio.

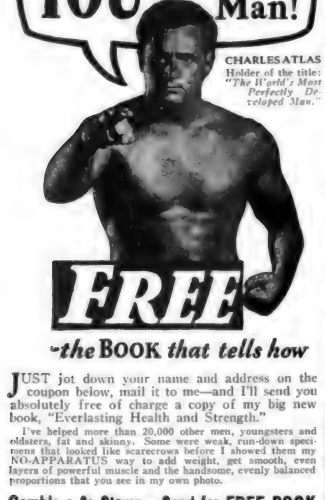
Please send me Free, and without obligation, a copy of your booklet, "Why Men Are Old at 40." Mail in plain wrapper.

Name .....

Address .....

City State

I Can Make YOU a New Man!



CHARLES ATLAS
Holder of the title: *"The World's Most Perfectly Developed Man."*

FREE

-the BOOK *that tells how*

JUST jot down your name and address on the coupon below, mail it to me—and I'll send you absolutely free of charge a copy of my big new book, "Everlasting Health and Strength."

I've helped more than 20,000 other men, youngsters and oldsters, fat and skinny. Some were weak, run-down specimens that looked like scarecrows before I showed them my NO-APPARATUS way to add weight, get smooth, even layers of powerful muscle and the handsome, evenly balanced proportions that you see in my own photo.

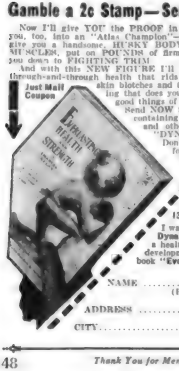
Gamble a 2c Stamp—Send for FREE BOOK

Now I'll give YOU the PROOF in only 7 DAYS that I can turn YOU, too, into an "Atlas Champion"—make a NEW MAN of you—give you a handsome, HUSKY BODY, give you big, POWERFUL MUSCLES, put on POUNDS of firm flesh, or if you are fat pare you down to FIGHTING TRIM.

And with this NEW FIGURE I'll give you NEW HEALTH—the through-and-through health that rids you of constipation, pimples, skin blotches and that half-alive, played-out feeling that does you out of the good times and the good things of life.

Send NOW for a free copy of my new book containing scores of pictures of myself and others who have used my secret "DYNAMIC-TENSION" Method. Don't delay—mail the coupon NOW for YOUR free copy of my new book. Address CHARLES ATLAS, Dept. 6-D, 133 East 23rd St., New York City.

Just Mail Coupon



CHARLES ATLAS,
Dept. 6-D,
133 East 23rd St., New York City.

I want the proof that your system of **Dynamic-Tension** will give me, too, a healthy, husky body and big muscle development. Send me a free copy of your book "**Everlasting Health and Strength.**"

NAME .....
(Please print or write plainly)

ADDRESS .....

CITY ..... STATE .....

PHOTOS ENLARGED

SIZE 8x10 INCHES

Now is your chance to get a life-like Bromide photo enlargement at an unusual bargain. Same price for full length or bust form, groups, landscapes, or enlargements of any group picture. Safe return of your original photo Guaranteed.

48c EACH

Send NO MONEY

Just mail photo or snapshot (any size) and within a week you will receive your beautiful life-like enlargement size 8x10 guaranteed fadeless. Pay postman 48c plus a few cents postage or send 50c with order and we pay postage. Take advantage of this amazing offer—send your photo today.

REX ART
538 So. Dearborn, Dept. 760 Chicago, Ill.

NEW LOW PRICES

GOODRICH-GOODYEAR Firestone - U.S. AND OTHER TIRES

Thousands of satisfied users all over the U. S. A. Our 15 years of business speaks for itself. This big responsible company will supply you with reconstructed standard make tires at lowest prices in history.
Guaranteed to give 12 months' service

Size	COUPLE Tires	Tubes	Size	BALLOON Tires	Tubes
29x4.40	$2.20	$1.00	29x4.40	$2.40	$1.10
30x3½	2.35	1.00	29x4.50	2.40	1.25
31x4	2.95	1.15	28x4.75	2.90	1.35
32x4	2.95	1.15	29x4.75	2.90	1.35
33x4	2.95	1.15	28x5.25	2.90	1.35
34x4	2.95	1.15	29x5.25	3.10	1.35
32x4½	3.20	1.45	31x5.25	3.10	1.35
33x4½	3.20	1.45	29x5.50	3.20	1.45
34x4½	3.45	1.45	32x6.00	3.30	1.60
35x4½	3.60	1.45	33x6.00	3.30	1.60
33x5	3.60	1.75	32x6.50	3.50	1.85
35x5	4.45	1.75	**All Other Sizes**		

DEALERS WANTED

Send only $1.00 deposit with each tire ordered. We ship balance C. O. D. Deduct 5 percent if cash in full accompanies order. Tires failing to give 12 months' service will be replaced at half price.

RADIO TIRE WORKS, Dept. 125-M
220 L. St., Northeast, Washington, D. C.

Print Your Own

Cards, Stationery, Advertising, labels, paper, circulars, tags, etc. Save money and time. Sold direct from factory only. **Junior Press $6.00, Job Press $11, Power $10.** Do popular raised printing like engraving with any of our presses. **Print for Others, Big Profits.** Pays for itself in a short time. Easy rules sent. Write today for catalog of outfits and all details. **The Kelsey Co., N-5, Meriden, Conn.**

NERVES?

Are You Always Excited? Fatigued? Worried? Gloomy? Pessimistic? Constipation, indigestion, cold sweats, dizzy spells and bashfulness may result from **NERVE EXHAUSTION.** Don't neglect your present condition. Auto shock, auto vibrator, Laughs how to regain Vim, Calmness and Self Confidence. **Send 25c for this amazing book.**

RICHARD BLACKSTONE, N-334 Flatiron Bldg., N.Y.C.

DANCE SKILL

WITH PROFESSIONAL POISE!

BEST Instruction Ever Offered The American Public. Send 20c for first lesson or $1.98 for complete course.

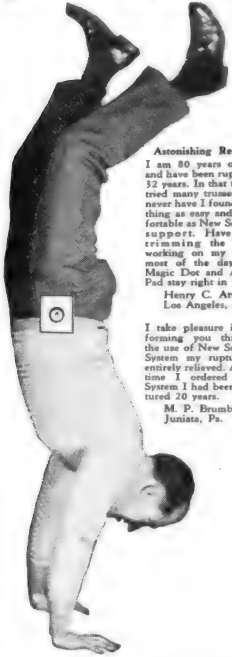
MONEY BACK after 5 days if not satisfied.

☐ TAP AND CLOG } Mark X for the
☐ BALLROOM } course desired.

DANCEOGRAPH DANCE ART, Inc.
555 Sutter St., San Francisco, California

Button Rupture Newest Way

[*Without Cruel Pressure*]



Astonishing Results

I am 80 years of age and have been ruptured 32 years. In that time I tried many trusses, but never have I found anything as easy and comfortable as New Science support. Have been trimming the lawn, working on my knees most of the day and Magic Dot and Airtex Pad stay right in place.

Henry C. Atwood,
Los Angeles, Calif.

I take pleasure in informing you through the use of New Science System my rupture is entirely relieved. At the time I ordered your System I had been ruptured 20 years.

M. P. Brumbaugh,
Juniata, Pa.

SCIENCE now advises discarding cruel steel springs, filthy leg straps and other ox-harness that severely press against the rupture and prevent nature from healing it. After thousands of test cases a new method has been perfected. It employs newest Magic Dot. Entirely new and different. It anchors in a way that allows circulation to heal where possible and of course permits the wearer to have consistent freedom of movement in safety. He can run, cough, bend, etc.

BREATHES AIR

Magic Dot weighs but less than an ounce. It comes to you on a generous Free Trial, by Actual Wear, and if you are not pleased you have your money back. With it comes all needed accessories to allow you to abandon your present truss if you so decide. Users often forget they are wearing Magic Dot.

FREE SAMPLE

Try to write this very hour so as not to forget it. You will get an educational book and an interesting material sample free of all cost or future obligation.

New Science Institute,

2583 Clay St. Steubenville, Ohio

New Science Institute,
2583 Clay St., Steubenville, Ohio.

Please send me free your illustrated book, sample of Airtex and full details of the amazing new way to button rupture. Include also your offer which permits me to see the New Science System without cost or obligation.

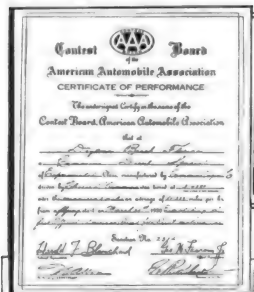
Name .....

Address .....

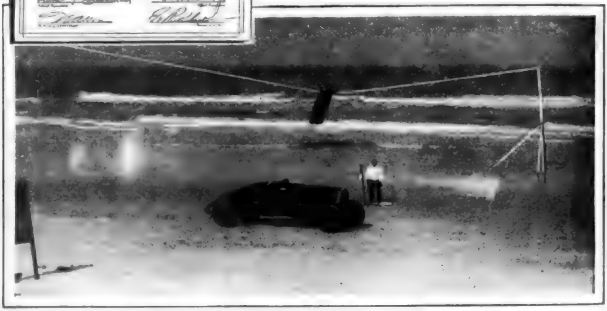
City ..... State .....

Print address and be sure of reply.

I Go 3 MILES for a Cent


Contest Board
of the
American Automobile Association
CERTIFICATE OF PERFORMANCE

Mr. Cummins at the wheel of his Diesel-engined car, in which he won the AAA performance certificate at left.


Flashing across the finish line at Daytona Beach, after setting the only official Diesel car speed record.

Will tomorrow's automobile cost its driver only a third of a cent a mile for fuel, using cheap oil instead of gasoline? That's all it costs Mr. Cummins to drive his Diesel-engined car. Read his important article on Diesel engine advantages for automobile use.

A FEW months ago when I drove my Diesel-engined automobile from my home in Columbus, Ind., to Daytona Beach, Florida, to set the first official record for an automobile with a motor burning heavy oil, I had painted on the spare tire cover a sign to the effect that I had driven the car from Indianapolis, Ind., to New York City at a cost for fuel of $1.38.

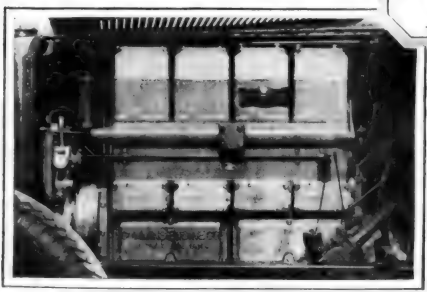
That sign made more people "Diesel-engine conscious" than all the words that have been written about engines burning cheap, low grade fuel oils. The personal and mail inquiries would have provided several months' work had I been intending to go into the manufacture of a Diesel-engined car.

For convenience's sake we usually say it costs a third of a cent a mile to run the car—an estimate based on an average of 30 miles to the gallon and ten cent fuel. Actually we

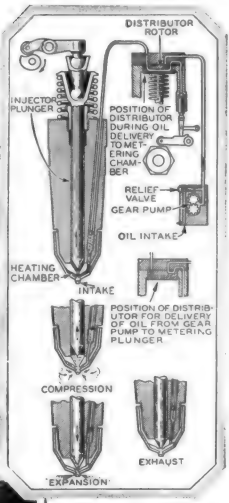
in MY CAR

by **C. L. CUMMINS**
As told to Jay Earle Miller

A Diesel engine requires all available space. Diagram shows relative fuel consumption of Diesel and gasoline auto motors.



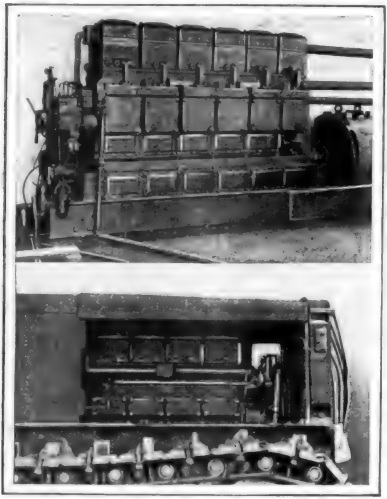
Left side view of the Diesel engine in Mr. Cummins' car is shown here. It fitted so snugly that there was no room for the fan, but none was needed since Diesels run cooler than gasoline motors. Because of limited production, Diesels cost more than gas engines of comparable power.



How the fuel is injected into the cylinders of a Cummins Diesel engine. A rotating disk in the oil distributor controls admission of fuel to the chamber, as shown. In the warming chamber it is heated to 180 degrees, and then forced into the cylinder by the injector plunger in the manner shown. This engine starts easily even on the coldest days, and develops full efficiency at once.

get from 28 to 35 miles, and fuel prices in different sections range from four to ten cents. Out on the west coast fishermen using exactly the same engine in boats are running from the well, at around 40 cents a barrel—and the engine runs just as well on crude as it does on fuel oil. You can figure out for yourself the operating cost at 30 miles to on one cent fuel, due to the over-production and depression in the oil industry. In some sections it is even possible to buy crude oil, just as it comes

Diesel Motors Cut Costs for Fishermen



Top photo shows a six-cylinder Diesel engine of Cummins' build, designed for marine use. Lower photo shows four-cylinder Diesel motor installed in a farm tractor, cutting costs of plowing to a few cents an acre through use of cheap fuel oil.

the gallon on fuel costing 40 cents a barrel.

Fuel economy and long life, I believe, are the two factors that have created so much interest in the Diesel-engined car, and they are the factors that are going to provide a ready market for a heavy oil car when one is put on the market.

To save you the trouble of joining the hundreds who have written me for information and prices, I will say right here that I am not contemplating going into the manufacture of automobiles. I am interested in developing a Diesel engine automobile because it offers us an opportunity for learning new things which can be applied to our regular business of building Diesels for yachts, navies, work boats, industrial locomotives, stationary power plants and similar uses. If some automobile manufacturer wants to buy a license to use Cummins patents, the engine we develop may eventually appear in a car, but that eventuality is not my primary aim.

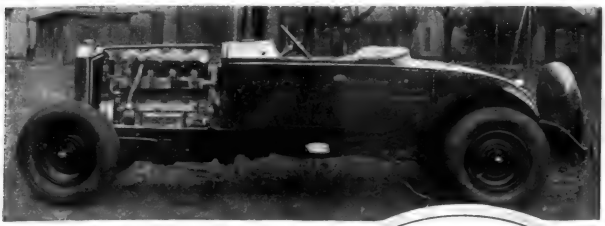
For the uninitiated I might explain that a Diesel, or heavy oil engine, is a power plant working on the self-igniting principle, a motor without carburetor or ignition, in which plain air is compressed to a tremendous pressure, becoming so hot in the process that when a minute quantity of heavy fuel is sprayed into it the fuel oil ignites from the heat of the air, burns the oxygen in the compressed air, and so provides the gas and expansion which is turned into power.

Because there is no carburetor, no spark plugs and no ignition system its operation is radically different from that of a gasoline engine, and therein lies its chief advantages.

As you all know, starting a gasoline engine on a cold day is quite a job. Cold gasoline does not vaporize readily, and so it does not mix with the air in the carburetor to form the explosive gas-air combination which you feed, through your throttle, to the cylinders. Some form of electric heater around the carburetor is often used, and you have to supplement that with a choke arrangement which reduces the amount of air in the mixture, and permits you to feed raw gasoline to the engine, with some resulting damage to the interior of your motor.

But we have never found weather so cold that a Diesel won't start on the first shot of fuel injected into the cylinder. Last winter I left my car sitting in a parking lot in Pittsburgh from Friday until Monday, and during that time a blizzard, with below zero temperatures, raged. Curious people had raised the hood and left it up, and on Monday the motor was virtually incased in a solid block of ice and snow.

Instead of a choke button we have a lever which "cracks" the inlet valves slightly and relieves the 500-pound compression in the cylinders, against which an ordinary small electric starter could not work. I lifted the compression, stepped on the starter, allowed it to get up speed for a moment, released the button, and at the first shot of fuel in the super-heated compressed air—500 pounds pressure at 1000 degrees temperature—the motor caught.

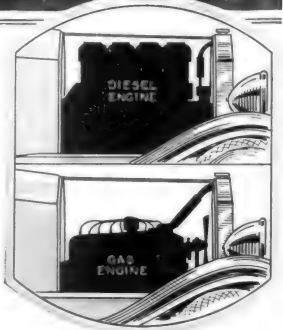


This is the car in which Mr. Cummins established the Diesel AAA record. The motor is fitted in a standard Packard chassis, with fenders and running boards removed to reduce air resistance.

And a cold Diesel needs no warming up, because the heat of compression provides all the heat necessary to burn the fuel. You can go into gear the instant the motor starts and it will deliver full power.

The car which I have been driving for the last year, and which has caused so much comment wherever it has gone, is an old 1925 Packard chassis and body, with a standard four-cylinder marine engine under the hood. The engine was built for a small yacht, and came right off the testing line in our plant. The Packard chassis was selected simply because it was the only thing we could find that had enough space under the hood to hold the big marine job. The old radiator was retained, but without the fan. We didn't have room for a fan when we got the engine in, and, because it runs much cooler than a gasoline engine, we didn't need one anyway. We used the transmission that came with the car, the only alteration being a change in the gear ratio to 2 to 1 to fit the engine, which was supposed to operate at 1,000 r.p.m.

The original sedan body was changed for a roadster a couple of months later, and the car driven overland to Daytona Beach for the official AAA tests. The sand was in wretched condition after a storm, but in spite of that we made as high as 83 miles per hour with that marine engined job. Our official certificate, the first world's record ever given a Diesel-engined automobile, credits us with an average of 80.389 miles per hour for ten miles—five miles each way over the course.



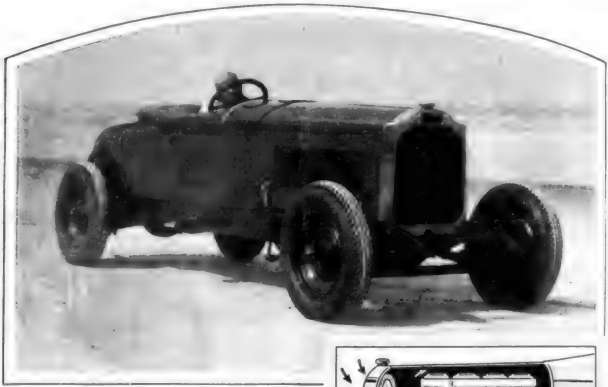
Comparison of the relative sizes of gas and Diesel engines of comparable horsepower. The tremendous compressions developed within the Diesel cylinders require very heavy, sturdy construction.

If everything goes well with a new race car for which Fred Duesenberg is building us a chassis and body, we'll have the world's first Diesel racing car in the 500 mile classic at Indianapolis next Memorial Day.

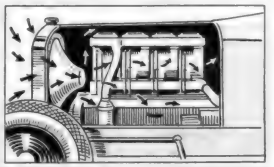
Essentially the engine in the race car will be the same four-cylinder marine job used in the present test car. The test car job was of heavy cast iron, with ten pound cast iron pistons, a four-inch bore and a six-inch stroke.

In the racing job we are using a dural block, alloy parts wherever possible, saving several hundred pounds in weight, and shortening the stroke by half an inch in order to come within the 366 cubic inch displacement rule which will prevail at Indianapolis

Diesel Race Car Now Being Built to Attain Speed of 125 Miles Per Hour



Another view of Cummins' car at Daytona Beach.



A Diesel-engined race car, being built by Mr. Cummins and Fred Duesenberg, will have a funnel placed behind the radiator and connected with the air intake manifold to compress air into the cylinders of the Diesel motor as shown above.

next May. Changing the block from cast iron to dural alone saves around 500 pounds in weight, and the completed car will only weigh 2300 pounds.

The racing engine will be turned up to 2500 r.p.m., at which speed it will develop about 125 h.p., as compared to 40 h.p. for the stock marine engine in the original test car.

In a Diesel engine you can pack the cylinder with all the air you can get into it and it works efficiently at any fuel consumption point up to the time when there is no longer oxygen to burn. When you reach that point it becomes manifest as a stream of black smoke from the exhaust, but up until then the efficiency of the engine is unimpaired.

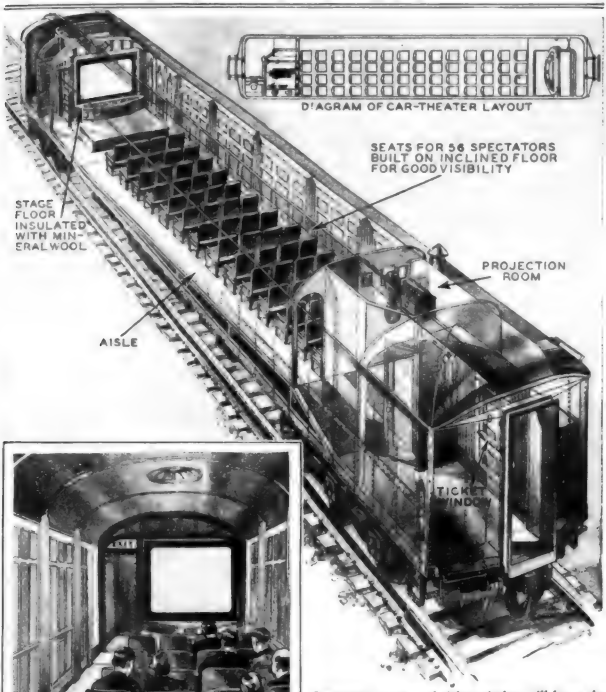
We are going to fit a funnel in the center of the radiator, connected to the air intake manifold, and use the tremendous air pressure in front of the speeding car to help pack the air into the cylinders during the intake stroke. Another novelty will be a tightly fitting hood enabling us to pack air in around the engine and maintain an excess air pressure there, instead of the usual partial vacuum which exists under the hood of a gasoline racing car. A fin at the rear will enable us to let out some of the excess air and set up a current through the radiator if we find more air is needed for cooling.

You probably are interested in knowing how our engine differs from gasoline motors, and how it differs from other Diesels, too.

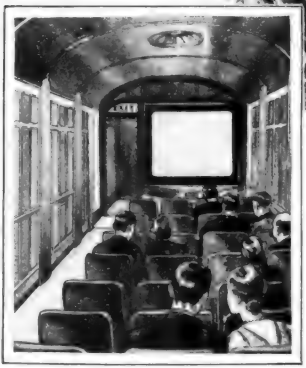
The basis of our system is a single fuel pump and metering system, which delivers exactly the same amount of fuel to each cylinder. Most Diesel engines have been built with a separate fuel pump, metering device and injector for each cylinder. We think that offers difficulties in getting the pumps so synchronized that they will deliver exactly the same fuel ration to each combustion chamber. The importance of exact metering of the charge can be realized when you un-

(Continued on page 202)

Talkies to Entertain TRAIN Passengers



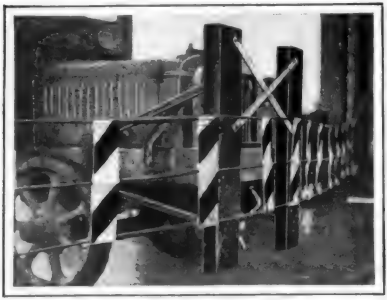
Projection room and ticket window will be at the front of new "Talkie Car" for de luxe trains. Noise is eliminated chiefly with special bearings.



The new talkie car theater will have 56 seats, arranged in rows of four as illustrated in the above drawing. Windows will be light-proofed from within and car will be decorated like modern theater, with attractive color scheme.

TALKIES are soon to be one of the amusements provided for passengers on de luxe trains of leading railroad lines. These "Talkie cars," designed by William D. Knox, of Birmingham, Mich., are being built for several railroads at a cost of $60,000. They will be decorated like a modern theater, and show latest pictures. Special roller bearings and sound-proof walls will eliminate noise.

Elastic Bridge Gate Stops Speeding Cars Without Damage



The five ton truck, traveling 15 miles an hour, was stopped in 14 feet, three inches by this resilient gate stop for bridges.

DESIGNED to protect autoists from crashing into open draw bridges, a resilient gate stop, shown in the photo at the left, proved a success in a recent test on the Interstate bridge, over the Columbia river between Portland, Ore., and Vancouver, Wash. A five-ton truck, traveling at approximately fifteen miles an hour, was stopped in a space of fourteen feet and three inches, without the slightest damage to the vehicle.

The gate, constructed of an elastic fibre connected at intervals with crosspieces marked to make them distinguishable, gives sufficiently to protect the cars from damage, but is strong enough to stop any car traveling at a reasonable speed.

Special Clothes for Dancing

THAT men ought to wear some special kind of light and loose fitting clothing when dancing is the contention of an eminent German physiologist. Dancing is clearly a variety of bodily work, and the conventional ballroom attire of men is altogether unsuitable for permitting the elimination of heat which the body gives off when in motion, as in dancing.

Cigarette Lighter Built in Cane

Lighter is built in cane.

THE latest word in combinations is represented in the new walking stick-cigaret lighter shown in the photo at the left. Built into the wood of the stick, the lighter springs out when pressure is applied to the button. Pressure on the small lever then ignites the wick, as in a standard lighter. When in normal position the lighter appears to be part of the cane.

Grass Clipper Eliminates Stooping

CLIPPING grass can now be performed without painful back-bending, using the new clipper shown in the photo below. The cutter is operated from a lever on the handle.

The grass clipper operates from lever on handle.

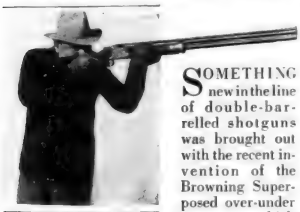
New Shipwreck Suit Will Keep Victims Afloat Indefinitely

SHIP disasters need no longer result in a great loss of life, thanks to the invention of the new Belloni life-saving suit, which permits shipwreck victims to float in a vertical position for an indefinite period. In rough or choppy seas a hood, with which the suit is provided, may be lowered over the head and breathing carried on through a special mouthpiece arrangement furnished with air valves. The suit proved a complete success in tests conducted at La Spezia, Italy.

The suit is made in two types, one being provided with a complete jacket and the other with only a collar. Both are quickly and easily donned in case of an emergency.

This new Belloni life-saving suit, with special hood, enables victims to remain afloat indefinitely. Inset shows two types of suits.

Shotgun Has Superposed Barrels



G. L. Becker, famous trapshooter, firing a Browning.

SOMETHING new in the line of double-barrelled shotguns was brought out with the recent invention of the Browning Superposed over-under type gun, which has the barrels located one above the other, instead of one beside the other. Using the gun, G. L. Becker, famous trapshooter, shown above, broke 401 targets without a single miss, proving the gun's effectiveness.

Handy Way to Find Cork Size

DRUGGISTS can quickly learn the size of a cork needed to fit any bottle if they will nail up near the bottle drawers a board with corks of all sizes screwed on it, small end out. The bottle is then punched onto the corks till the cork of correct size is found. This is a great little time-saver.

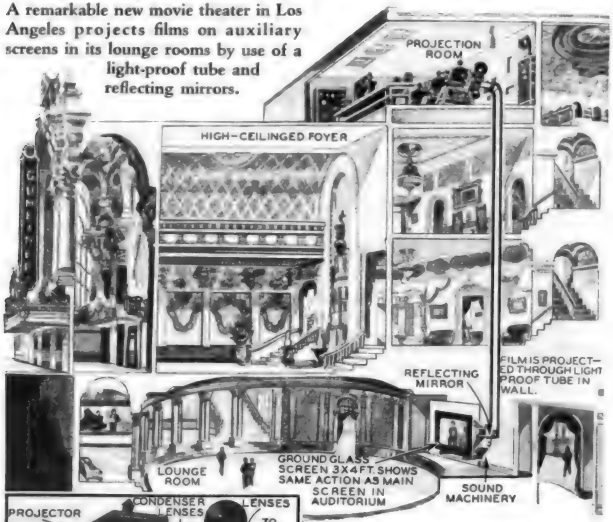
Rubber Tired Train Wheels

DESIGNED to increase comfort of train passengers, a recently invented rubber cushion, placed between rim and hub of wheel as shown in the photo below, absorbs all jars and shocks caused by passing over crossings, switches, etc.

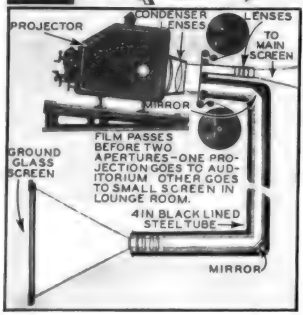
The rubber cushion, inserted between rim and hub, absorbs shocks of switches and rail joints.

Movie Shown on 2 Screens

A remarkable new movie theater in Los Angeles projects films on auxiliary screens in its lounge rooms by use of a light-proof tube and reflecting mirrors.



Cutaway view of theater, showing tube through which indirect projection of the film is made.



This diagram shows how the film is projected through two apertures, the lower being reflected to an auxiliary screen through a black tube.

AN ELABORATE new talkie theater now being built in Los Angeles, home of the movies, is able to project its feature film to one or more auxiliary screens in its lounge rooms, simultaneously with the showing on the main auditorium screen.

To the person not versed in optical laws, this may appear as a simple innovation, yet it is the result of years of experimentation by the most noted scientists in the country. While the people in the auditorium are viewing the picture on the big screen, the waiting patrons in the lounge room, and other ante rooms, see the picture simultaneously on a miniature screen 36″x48″, accompanied with complete sound effects.

At the outset, this may seem as a novelty

at Same Time

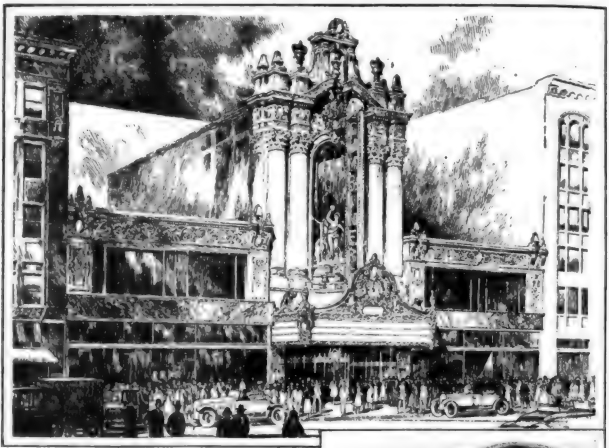
Ingenious mechanical devices provide for the comfort and convenience of patrons in the new theater. Seats are arranged for perfect visibility, those at the sides being slightly higher. When a seat is vacated, a light is flashed to inform the ushers. Nursery, beauty parlors and barber shops are at the disposal of patrons. Thermostatic controlled ventilators keep theater constantly at an even temperature.

only. But it has a distinct commercial value to continuous performance theaters. While a patron is waiting admission to the auditorium, he can see the picture in miniature. After gaining entry to the auditorium, he probably will leave when the picture reaches the point where he first viewed it in miniature. So the seats are vacated sooner, and the box office profits.

To go into the intricate optical laws which make possible the indirect projection, would be about as intelligible to the average reader as the Einstein theory or the fourth dimension. But the rudiments of the system can be gleaned from the photo-diagram.

It must be assumed that the average reader understands how a picture film passes through the projection machine. The "frames" —that is, each individual picture on the strip of film—are exposed momentarily before the aperture in the gate of the projection machine. A powerful light is focused upon the aperture, and projects the image on the film through a lens to the screen. Seemingly, pictures in motion result.

Now, if a second aperture is cut in the gate, two frames can be exposed simultaneously. A special condenser lens floods both apertures with light. The light beam from the second aperture, carrying the picture image, is conveyed through a black-lined tube fitted with special mirrors and lenses, to a



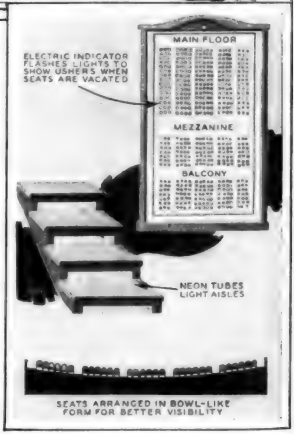
Above is shown an architect's drawing of the external appearance of the new Los Angeles theater.

remote point where it is projected on the back of a ground glass plate. The visible result is similar to looking into the finder of a camera.

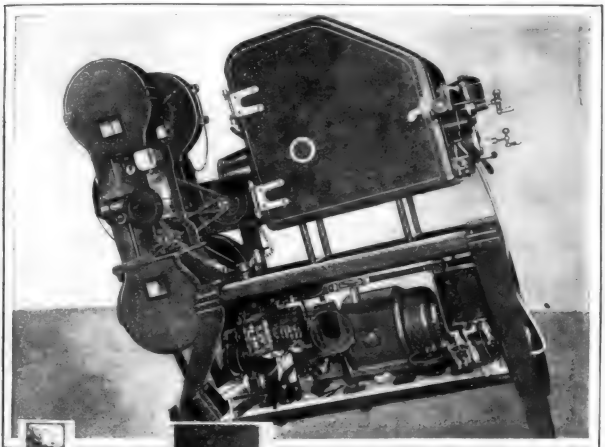
S. Charles Lee, nationally known architect, designed this theater with view to providing more than mere entertainment.

An ultra-modern barber shop with complete valet service is provided for the men patrons, while the children are catered to with unique playrooms. The ceiling and walls of these rooms are an excellent imitation of the interior of the menagerie tent at a circus. Around the walls are miniature cages with miniature mounted animals—lions, tigers, elephants, giraffes—all exceptionally life-like in appearance.

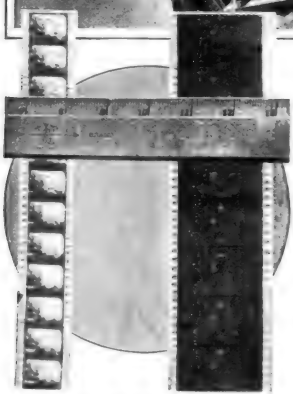
The lounge room is especially commodious, and can accommodate 400 persons. Adjacent to this room is a cafe serving light lunches. Also an exhibition room where "objets d'art" are on display. At one end of the lounge room, built into the wall behind heavy plate glass, is a broadcasting room from which the theater programs can



These novel features of the magnificent new theater add to the comfort and convenience of patrons.



This special projector must be used in projecting the three-dimension film described at left below.



This shows how the Spoor-Bergen natural vision film, recently invented, compares in size with ordinary film, being twice as wide. The film projects motion pictures which take on a three-dimensional effect. In using this new process, not yet widely adopted, a screen twice as large as the size now usually employed must be used.

be "put on the air." Patrons can see this in operation. There are no permanent fixtures attached to the floor of the lounge room, so all furniture can quickly be removed to convert the room into a ball-room.

Mechanical and electrical features of the theater are very novel. The theater is sectionally ventilated. Sensitive thermostats are placed at numerous points in the building. If a crowd collects at one point, the bodily heat will affect the thermostat, which, in turn, operates the ventilators, and provides cooler air to that section of the building.

The floor of the main auditorium of the theater not only slopes toward the stage, but is also concave—the side seats rise above the center seats. Every seat in the house provides an unobstructed view of the stage or the screen. Behind a ground glass panel in the front of every step in the aisles, is a green neon tube. These provide a grassy-green pathway along the aisles, which make the aisles clearly visible to the patrons, but diffuse no light upon the projection screen.

LATEST AIDS for the HOUSEWIFE

This new electric permanent waving machine enables housewives to dress their own hair at home.

Cooled by air admitted through grate in bottom, the new window refrigerator cabinet shown above keeps food safe and sanitary.

This handy electric food mixer mashes potatoes, mixes icing and salads, and can be converted into fruit juice extractor.

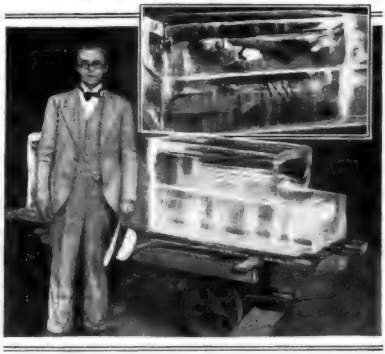
Above photo shows new baby bottle which clamps on side of crib, chairs, etc., and folds away when not in use.

Dirt, litter, etc., is gathered up with one simple motion with this new brushpan.

Portlander Lives Frozen in Ice Block for Thirty Minutes

A SCIENTIFIC experiment that bewildered thousands was performed when A. Moro, of Portland, Ore., allowed himself to be frozen up in a solid cake of ice for thirty minutes at an annual newspapermen's midnight frolic held recently in Portland. At the end of the half hour of imprisonment, the ice block was chopped open and Mr. Moro emerged bright and healthy, a little chilled, perhaps, but otherwise unaffected.

Mr. Moro is enabled to accomplish this remarkable feat because of his ability to get along with a minimum supply of oxygen for an unusual length of time. In performing the stunt, he crawls into the cavity formed in two blocks of ice as shown at right. Ice is then melted around him to inclose his body in the cavity.



Above photos show Mr. Moro, of Portland, frozen in ice block, where he remained for thirty minutes in scientific experiment.

"Eternal Match" Lights 600 Times

Dr. Ringer, Vienna scientist, with his invention, the "Eternal Match," which lights 600 times.

A RECENTLY invented match called the "Eternal Match" because it can be lit 600 times in succession before becoming useless, bids fair to become one of the greatest commercial inventions of the last 20 years. The new match is shown above with its inventor, Dr. Ferdinand Ringer, of Vienna, Austria.

Canada Tar and Gas Yield Fuel

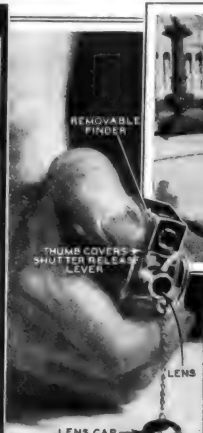
COMBINATION of two natural products of western Canada, which are almost useless, tar and natural gas, to make large quantities of gasoline is forecast by an eminent Canadian geologist. Beneath Alberta fields there exist large deposits of sand containing tar, which, by a process of hydrogenation, using the plentiful natural gas of the country, can be converted into fluid oil and thence into gasoline, for use in engines of all kinds.

Dropper Rubber Makes Tripod Tip

THE picture shows how the bulb of an eye-dropper may be forced over the tripod tips to prevent slipping on surfaces which endanger the stability of the camera. The end of the bulb should be padded with compressed paper.

"Candid Camera" Gets Surprise

These enlargements were made from watch camera negatives whose original size is shown in the corners.



This photo shows how the "candid camera," in size and appearance almost identical with a watch, is used in taking unexpected pictures.

How the watch camera is loaded with a new film roll. At left, actual size photo specimens.

A NEW hobby, one that also offers opportunities for money making, has arrived from England. It's the "candid camera," a concealed camera that gets intimate pictures without the subject knowing he is being photographed. The results are so surprising, and often so amusing, that the hobby has taken England by storm. Hardly any social function is complete without several guests carrying the concealed cameras.

The "candid camera," strangely enough, was developed in this country and has been on the market for years, without its possibilities being appreciated. It is simply a tiny affair, shaped like a watch, 2⅛ inches in diameter and ⅞ of an inch thick, taking pictures ⅝ by ⅞ inches. The tiny lens, concealed in the watch stem, is good enough to get indoor pictures, and the films enlarge nicely to several times their original size. Rolls holding 10 or 20 exposures can be accommodated in the case.

The watch-camera was originally a device for detectives, until news photographers found it could be used to advantage in places where ordinary cameras were barred. A photograph of the electrocution of Mrs. Ruth Snyder in Sing Sing prison—a picture that caused a sensation in newspaper circles—was taken with one of the cameras. The photographer wore it on his ankle, like a bracelet, and so got by the scru-

Photographs in New Hobby

Another trick camera is this German product which, resembling a field-glass, takes photos out of its side.

The man on the right above is having his picture taken, all unknown to him.

tiny of the guards who were looking for cameras. In the death chamber he crossed his legs, pulled up his trousers a bit, and proceeded to shoot pictures of the scene.

A favorite trick with newspaper photographers in court rooms and other places where cameras are barred is to make a small hole in a hat, and then hold it on the lap, with the camera inside. A view finder, which comes with the camera, is detachable, and with practice it can be aimed like a revolver. The film winding device gives an audible click each time a new film is wound into place, so an entire roll can be shot without looking at the camera.

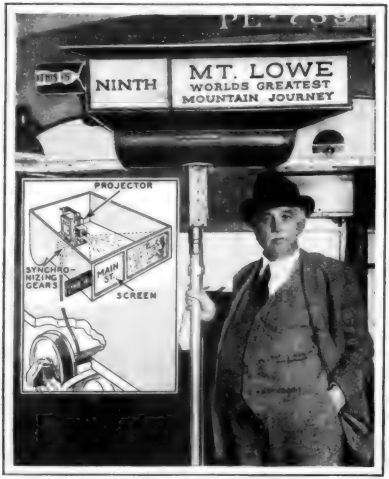
Another camera particularly adapted for taking out-of-doors pictures without the knowledge of the subject is a German importation, with a fine Carl Zeiss lens. It is disguised to look like a prism field glass, but the objective lens is merely a blind, and the eye piece is part of a prism finder. When it is held to the eye you apparently are looking off in the distance, but actually are seeing objects and persons standing off at one side. Pressing a button opens a door in the side of the instrument and trips the shutter. A film pack is fitted into a flat space on the opposite side of the case. Owing to the excellent lens the camera works up to 1/300th of a second, permitting its use indoors, if you can find some excuse for using a field glass in the house.

The "candid camera" hobby got its start in England a few months ago when a photographer shot unexpected pictures of Queen Mary.

The eyepiece of this camera is actually a finder. Vest-pocket size photos are taken.

A method commonly used by courtroom reporters, that of hiding a camera under a hat which is lifted when a scene is to be snapped, is here illustrated. Sometimes a hole is cut through the hat large enough to admit the lens of a watch camera, and the photo taken in that manner.

Announcer for Trolleys Shows Streets on Movie Screen



In this new automatic street announcer, car wheels are geared to movie projector, which shows streets and ads on a screen.

AN AUTOMATIC street announcer for street cars has been put into service for the first time in the United States on cars of the Pacific Electric company at Los Angeles.

The announcer performs its function by means of registering the street at hand upon a screen, the signs being projected from an ordinary motion picture film, as shown in the drawing at the left. The mechanism of the projector is geared to the wheels of the car so that whenever the wheels move the film must move proportionately.

Each street name, as the car approaches a scheduled stop, appears first at the lower part of the screen and slowly moves towards the top where an arrow on which are the words "This Is" points to the then location of the car. There are thus usually two street names on the screen at one time to show present street and street being approached, as well as ads of concerns near by.

New Brush Cleans Tongues

Health is improved by cleaning the tongue regularly with the new brush, shown above, which has long handle curved to fit.

THE latest step in the field of inventions designed for the improvement of personal health is represented in the new brush for cleaning the tongue. The brush, shown in the photo at the left, has an unusually long handle, curved to fit the mouth, and thus reach any part of the tongue which may need cleaning.

Stamp Printer for Private Firms

A MACHINE for the printing of postage stamps by private concerns has recently been devised. This machine, shown below, prints a gummed label which records the amount of postage in dollars and cents, the class of mail, the weight of the parcel, date, city, state, and zone to which the mailed matter is to be sent. As the machine does away with the annoyance of selecting and fixing to packages the numerous kinds of stamps, it facilitates the task of sending out large quantities of mail.

The new stamp printer which records postage.

British Build Largest Land Plane

This phantom view of the H. P. 42 shows the enormous size of the plane and gives an idea of the pains taken to cater to the comfort of the passengers. To combat noise of engines and propellers, cabins have been placed below the wings with a packing around the fuselage.

Photo shows the giant air liner taking off on its first flight.

THE Handley-Page Company of England, which is building a fleet of gigantic airliners for the Imperial Airways, recently completed the first of these mammoth ships, which made a successful trial flight.

Seven other of these planes are now under construction. Three, similar to the one shown here, are to be known as the Western type and are to be used on the continental air routes. The other four are to be known as the Eastern type and will be used in the East and on the South African lines which supply mail and passenger service from Europe to South Africa. Externally, these two types are alike, but the Western type has a larger seating capacity, accommodating forty passengers, while the Eastern type will contain more cargo and mail space.

BELIEVE

"Rip," famous cartoonist, tells how he makes $1,000,000 a year out of your curiosity, and how he once socked Jack Dempsey on the jaw and got away with it—Believe it or Not!

Believe it or not, Ripley once connected a healthy right hook with Jack Dempsey's jaw, and lived to tell the tale. The picture above proves it.

HAVING been called a liar more times than any other person or group of persons in the world in any epoch, I want to state a discovery of mine which created about as much excitement, in my life anyway, as the feat in question itself.

Believe it or not, Colonel Charles A. Lindbergh was the 67th man to make a non-stop flight over the Atlantic Ocean. When I published one of my "Believe it or not" drawings some time ago, depicting the Spirit of St. Louis in flight, asserting that its pilot was the 67th to attempt that adventure, I was besieged with an avalanche of protests. They crowded in by mail, telegram, telephone and "tell-another".

My "Believe it or not" cartoons of curiosities appear in about 250 newspapers throughout the country and are digested by over 20,000,000 readers, so you can well imagine what a squawking a multitude like that could let up if I made the slightest error. There are still a lot of people who don't believe that 2 and 2 can make 5.

Believe it or not, Zaro Agha, 136-year-old Turk, gave Ripley a nip and tuck tussle on the wrestling mat.

Well, when I made that crack about Lindbergh, it was a hullabaloo to pay. I pride myself on the fact that I have always been able to prove myself correct.

Nearly all of the complaining customers believed that Lindy was the first to make a non-stop flight across the Atlantic. And the few who did remember that Alcock and

it or NOT!

by **ROBERT L. RIPLEY**
told to Alfred Albelli

Believe it or not, this pile of mail in which Ripley is submerged to his neck represents only a week's letters from fans who have written the artist offering ideas or asking for proof of some of the seemingly incredible facts illustrated in his drawings.

Believe it or not, the black and white "Believe it or not" cartoons created by Ripley bring him gross returns of $1,000,000 a year. This style of drawing is said to be the most imitated in the world.

Brown had flown over (and I was amazed how few were in this category), couldn't for the life of them imagine who the other 64 might be.

And since I am citing the Lindbergh example, I am showing you a sample of how I am always prepared to solve, explain or prove any of my "Believe it or not" phenomena. What happened in that case was that you forgot all about the two dirigibles!

You recall that Sir John Alcock and Sir A. Whitton Brown made the first non-stop flight over the Atlantic in 1919, from Newfoundland to Ireland. Later, the same year, the English dirigible, R-34, with thirty-one men aboard, crossed from Scotland to America, and returned.

In 1924, the German ZR-3, which is now the Los Angeles, flew from Friederichshafen, Germany, to Lakehurst, New Jersey, with a crew of 33 men.

Lindbergh was the 67th.

Believe it or not, the "L" which divides my name is for Leroy. I was born in Santa Rosa, California, less than forty years ago. If I might lend a little of the weird touch of my cartoons to my own life, I might confess that I was born on Christmas Day, 1893. My mother, Lily Belle Yocka Ripley, was born in a covered wagon when my grandparents were en route to the West Coast. My father swam

Showing Successive Stages in Producing a "Believe It or Not" Cartoon

This shows the first stage in laying out a "Believe it or not" drawing. The general proportions are blocked out and fitted into the page layout.

Stage two in making the drawing consists of blackening in some of the solid areas, creating a more definite outline of the figures. Ripley makes his drawings in his rooms.

Stage three—Here the drawing nears completion, with many of the finer details added. Final stage is shown across the column at the right.

the Ohio River at the age of 14 when he ran away from home.

I never studied art. Never had a drawing education. They tell me that at a very early age I developed a talent for drawing comic pictures. The first cartoon I sold was entitled, "The Village Belle Was Slowly Ringing."

It showed a homely country maiden wringing out the wash.

Now, I'm not a mechanic. I've never dabbled in the spheres of science as a scholar might do. Neither have I ever been in an engineering school. I wouldn't recognize one if I fell over it.

And yet, believe it or not, I've got more facts concerning those callings in my sconcepiece than any other man alive. It is true that I would be confused before a table of logarithms or a lathe, but what man can snap his finger and pipe the fact that in 1927, James Lanvier, of Edinburgh, sneezed 690 times in succession? That's a record not to be sneezed at.

My mechanical and scientific knowledge really consists of freaks. Hardly a week passes that I do not get close to 3,000 letters. These are full of curios. Each one tells me of some oddity which seems incredible, but is true.

My cartoons illustrating strange and bizarre facts were first cast into print one winter evening about ten years ago when I was the sports cartoonist for the old New

This Chinese youngster, posing for a sketch by Ripley, is a "believe it or not" subject. His name is One Long Hop. He was born on the day of Lindbergh's famous flight—hence the odd name.

Here the drawing is finished and Ripley is putting in the lettering, after which it is ready for reproduction in newspapers throughout the country.

York *Globe*. Formerly I had been on the San Francisco *Chronicle*, where I slaved with my inks and brushes for $22.50 and liked it.

The big boss dropped in and said he wanted something a little out of the ordinary. He was getting fed up on the general run of sports comics. I took plenty of time out to ransack my bean for an idea.

All of a sudden I remembered the feat of J. Darby, a Britisher, who had jumped backward almost thirteen feet, with weights in his hands. Nobody would have believed that at the time unless there had been an army of witnesses and a load of press stories telling the world about it.

Then I began to recall other unusual athletic achievements. They came rushing back through the gates of my memory in a steady cavalcade. I thought of R. P. Williams, who did a running high-kick of ten feet, three inches. I remembered the chap who walked across the continent backwards.

Then there was the man who hopped a hundred yards in record-breaking time. Pauliquen, the Parisian, who astounded the world by remaining under water six minutes and twenty-nine seconds.

In no time I had enough for an entire page of sport freaks. For want of a definite title, I called the collection, "Believe it or not". Instantaneously letters began to pour in by the bushel. That's always a sign you're running, as we say. In time the "Believe it or not" craze spread like wildfire. To date, besides my newspaper audience, I've been on

This is the way Ripley appears to the eye of the movie camera, making a talkie in which he shows how he makes his drawings. The subject being drawn is an African with horns projecting from his forehead.

the radio, in the talkies and even in a television broadcast.

Back in those distant days, it would have made a good cartoon to picture a sprinter doing 100 yards in ten flat. But I'm now hoping to see the day when I can record that some errand boy has done the hundred in seven seconds. That'll make a good "Believe it or not".

Here are some of the most recent curiosities which I have reproduced in my cartoons: the Hindu fakir who held his hand aloft for fourteen years until birds built a nest in his palm. A Mongol Tzern rode 1,800 miles in 9 days. The dog that actually smoked. The man who yawned and broke his jaw. The Norwegian who drank 90 pints of beer at one sitting. The man who sat on eggs and hatched chickens.

Believe it or not: Daniel Webster received 8,000 votes for the presidency of the United States—after he was dead. An ostrich can run faster than a horse. A colored steward on the U. S. S. *Whitney* killed a chicken, picked, cleaned, cooked and ate it in four minutes. A boxer's baby was born with a black eye. The Vivaros of Ecuador can blow darts from a blow gun 160 feet with deadly effect. And if you want to know the world's longest cussword it's "Himmelherrgottkreuzmilliondonnerwetter".

Zaro Agha, the gent whom I say believes that it's never too late to yearn, was located by me when he reached his 153rd birthday. That was his wedding-day back in 1927. Last summer he came to Broadway and you may have seen the Turkish trophy, who left his bride behind in Constantinople, having a little innocent sport with some chorus girls.

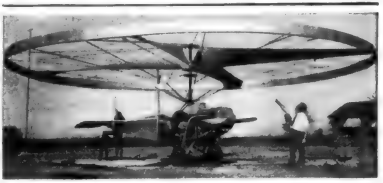
Back from behind the Chinese Wall I have received a gracious letter recently from a Chinaman who protests that Zaro is only a kid alongside him. The venerable celestial says he has, believe it or not, documents to prove that he has just celebrated his 200th birthday. I'm going to get those two youngsters together some day and play a good old-fashioned game of marbles with them. Zaro was quite a nimble and vigorous fellow.

(Continued on page 206)

Helio-Gyrocopter Has Been Designed for Vertical Ascent

A STRANGE craft, combining the principles of the gyroscope, helicopter and airplane, recently passed initial tests at Los Angeles, where it succeeded in rising vertically from the ground for a short distance.

Four blades, made of steel cable covered with airplane fabric, radiate from the central power shaft. These are connected at their tips by a circular rim a foot wide. The blades flatten out as speed is increased.



Jesse D. Langdon, of Bell, California, is shown pointing to his invention with which he hopes to achieve vertical flight.

Finds New Purpose for Old Pet

The one and only Ty Cobb with his "golf bat."

TYRUS RAYMOND COBB, who holds more batting and base running records than any player in the history of baseball, has recently introduced a novel midiron which he hopes will help his golf. The handle is made from one of his favorite baseball bats.

Clock Will Switch Radio On - Off

NOW that all-electric radios are general, a special clock has been designed with a switching device for turning receivers off or on at any predetermined time. It may be set in advance for any desired reception, as setting for morning exercises the night before, or may be used to turn off the receiver at the end of a program coming in at a time when the listener is a considerable distance away. In the use of the receivers for demonstration purposes in stores it is expected that this clock will find a wide use.

Keeps Absorbent Cotton Clean

A LEADING manufacturer of surgical supplies has recently introduced a novel package for the purpose of keeping absorbent cotton in its original sterile state until the contents of the package are completely consumed, making it unnecessary to unroll a blanket of cotton, pull off what is needed, and roll the blanket again. The cotton is prepared in a continuous rope which is coiled within the container.

The Cotton Picker. An improved container which keeps the cotton clean until it is completely used.

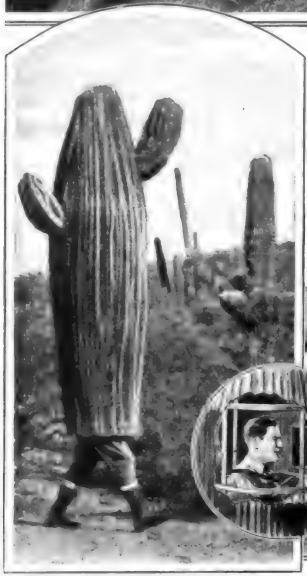
Desert Animals "Shot"

The Coati, a desert inhabitant which occasionally pays us a call from Mexico. This rare animal is closely related to the raccoon of our country.

A CACTUS plant recently went for a stroll in the desert and came back with a remarkable collection of photographs, some of which are presented on this page.

Of course, this perambulating cactus plant was all a delusion and a snare, as many of the coy inhabitants of the Mexican border will learn when they see their portraits in print for the first time.

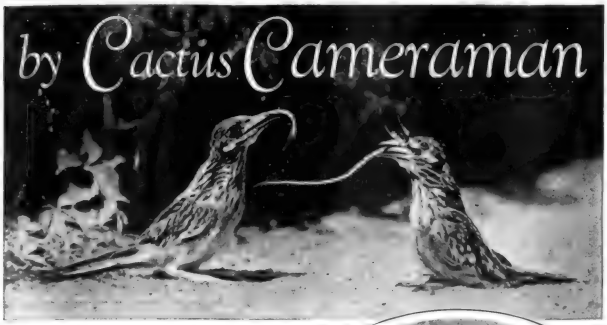
When the Finley-Pack Expedition of the American Nature Association arrived on the



The desert cameraman is shown going on location. The inset drawing shows how the camera was arranged inside the imitation giant cactus plant.

Starting him on the bottle. This youthful coyote was taken from a cave in the rocks by the Finley-Pack Expedition of American Nature Association. Hunger introduced him to his newfangled mother.

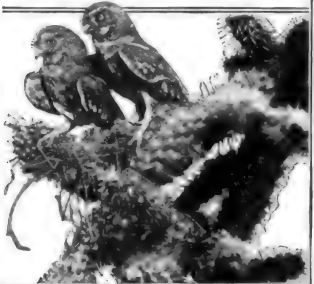
by Cactus Cameraman



Two road runners are caught in the act of enjoying their dinner, making fast work of a 12-inch lizard, as shown above. That's the tail going down.

Mexican border and at the Saukaura Forests of Arizona, they found the wild life there so shy that extraordinary methods had to be resorted to in securing photographs, hence the prickly pedestrian.

So perfect was the cameraman thus disguised that many of the animals, hitherto unphotographed, walked right up to the cactus, little knowing that they were being "shot" at from the inside. The expedition was led by Arthur N. Pack.



They seem to be stuck on their home. Two elf owls on a Chollar cactus, one of the most prickly plants of the desert. These rare birds live on crickets and grass-hoppers found on the desert.

An elf owl looking out of the door of his home. The woodpeckers bore into the cactus, and these birds then appropriate it as their home.

Old Ford Auto Horn and Fruit Jar Make Drink Mixer

Copper tubing soldered to the Ford horn motor, to which is fitted the fruit jar cap, makes this mixer.

IF YOU can lay hands on an old Ford auto horn and a fruit jar the task of providing yourself with an inexpensive and serviceable drink or salad mixer, egg beater, etc., will be an easy one. The completed device makes a very compact unit that will do its job thoroughly.

First the Ford horn is detached from its base and the sounder is separated from the megaphone section. As the motor which operates the sounder is designed for use with a six volt storage battery, an electric heater unit will have to be added in the circuit to make it suitable for use with 110 volt house current.

The revolving beater is made by soldering a length of ¼-inch copper tubing onto the armature of the horn motor. In the other end of this tubing cut a slot and fit into it a piece of fairly thick sheet copper cut in a design shown in the photo at the top of the page.

This beater unit must next be made to fit snugly onto the fruit jar. This is done by punching a ⅜-inch hole in the fruit jar top to permit the passage of the beater rod. The top is then soldered into the case covering of the motor. When this is finished the motor with the beater rod can be screwed onto the top of the jar, thus forming a compact and tight-fitting unit.

Auto Fenders Make Bridge Guard

OLD auto fenders can be salvaged and made to serve as decorative guards for small bridges as shown in the photo at the right. They are nailed to the supports on the sides, and painted in various colors and designs, according to the taste of the builder. Of course, the fenders should be matched to improve the appearance.

Old fenders are nailed along the bridge sides as shown.

New Gas Mask Permits Its Wearer to Talk Over Telephone

CARRYING on a telephone conversation while wearing a gas mask is now possible, thanks to the perfection of a new mask developed by the chemical warfare division of the U. S. Army. Besides being more comfortable to wear than older types, the mask will be especially valuable to scouts and observers at the battlefront, enabling them to keep in communication with headquarters over the telephone lines, even in the midst of a gas attack.

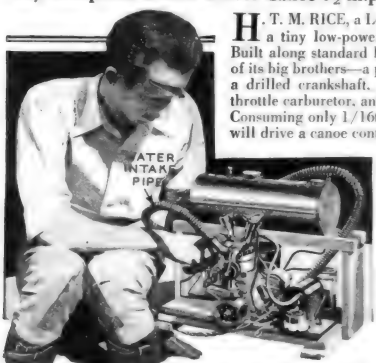
Equipped with a newly developed gas mask, Col. Charles Alley is shown above carrying on a telephone conversation. The diaphragm in the mask makes this feat possible.

New Condiment Tastes Like Meat

A WHITE powder that tastes like the juice of red meat yet can be eaten by the strictest vegetarian, since it has no trace of meat in it but is made from the gluten of flour, is announced by A. D. Little, Inc., Boston chemical engineers, as increasing in popularity in Japan and China and as now being introduced into the United States. It is a chemical called sodium glutamate made by boiling gluten from wheat flour for hours with strong hydrochloric acid, neutralizing with soda and allowing the resulting salt to crystallize. There is obtained a fine white powder resembling baking soda which keeps well and may be used in an ordinary shaker like salt.

Tiny Low-power Motor Drives Canoe 6½ m.p.h. on 1/16th Gallon of Gas

H. T. M. RICE, a Los Angeles inventor, has constructed a tiny low-power motor for installation in canoes. Built along standard lines, the motor has all the features of its big brothers—a pressure oil feed and two oil pumps, a drilled crankshaft, a sixteen jet float valve, a barrel throttle carburetor, and a dry cell battery ignition system. Consuming only 1/16th gallon of gas per hour, the motor will drive a canoe containing three passengers at a rate of six and one-half miles per hour.



This tiny gas motor is of standard construction, and will drive a 13-ft. canoe carrying three passengers at a rate of 6½ m.p.h.

Curtains Shut Out Sunlight

WINDOWS presumably are put in houses to let in the healthful rays of sunlight, yet in most cases they seem to serve the purpose of keeping out light—window screens, dirt, curtains and shades being the chief offenders. An abundance of light is indispensable to good health, and, according to Professor Higbie of the University of Michigan, it is advisable to cut down all obstructions to a minimum.

Next—100-Story

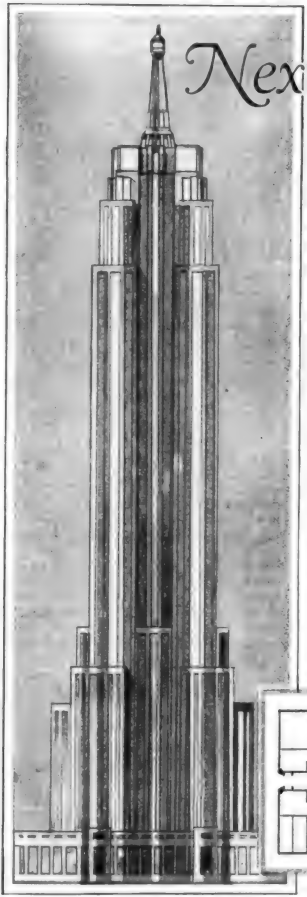
by BEVERLY BARNES

Buildings rising two hundred stories into the air are now within the realm of possibility, but with the present limitations they would be mere towers housing elevator shafts. Ingenious methods of vertical transportation, such as placing two elevators in one shaft as described below, may make the sky the limit.

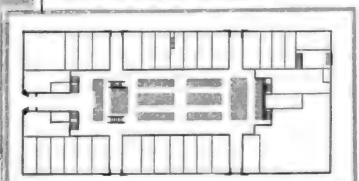
HUNDRED story buildings, dwarfing the 88 story Empire State building, now rising on the site of the old Waldorf-Astoria Hotel, are visioned as a reality in the near future by business men of New York.

To make that vision possible they have petitioned the city to amend the building code to permit elevators to travel at 1400 feet per minute, instead of 700 feet, the present limit, and to permit double deck elevators or two separate elevators in one shaft.

Curiously enough the elevator, a comparatively modern invention, is the only limiting factor on how high a building may go. Solve the elevator question and 100 or even 200 story buildings are quite possible. The trouble is to get an elevator system that will be fast enough to move the traffic and will not take up so much valuable space as not to leave enough rentable area to earn a respectable income on the investment.



A profile of the 1243-foot Empire State building, showing how the banks of the numerous elevator shafts take up a large percentage of space.



A ground floor plan of the world's tallest building is shown above, revealing how the banks of sixty-six separate elevator shafts consume more than one-fourth of all the available floor space. Two elevators in one shaft reduces parasite space.

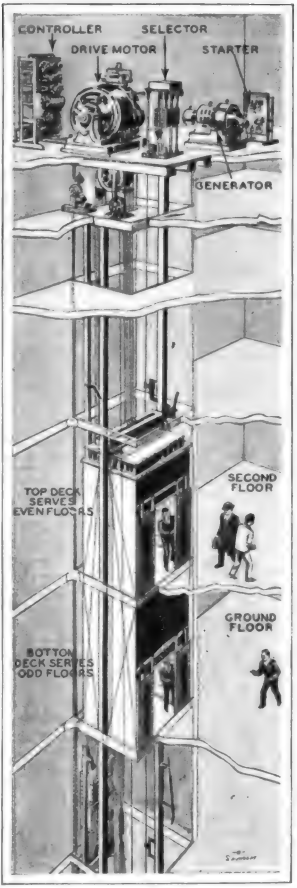
BUILDINGS

If you want some idea of how much space the elevators of a modern skyscraper take up, look at the ground plan of the Empire State, the 1243-foot super-skyscraper rising under the guidance of former governor Al Smith. The huge pile has a frontage of 197 feet 5 inches on Fifth avenue and 424 feet 9½ inches on 33rd and 34th streets, occupying the entire block between them. But virtually one-fourth of all that ground area is taken up by the elevator banks and their hallways. Of course, as the building ascends, the shorter shafts, locals and lower express banks, come to an end, but the building set-backs also reduce the available renting area in more than equal proportion.

It will take sixty-six elevators to serve the world's tallest man-made structure—sixty-seven when the elevator is installed in the dirigible mooring mast on the roof, a mast whose tip will be 243 feet higher than the famed Eiffel tower in Paris. Eleven of them, ten passenger express cars and one freight, will rise as high as the 80th floor, the ten express cars traveling 951 feet, while the freight elevator, which descends into the sub-basement as well, will have a vertical rise of 981 feet. The upper tower floors, from the 79th to the 86th inclusive, will be served by local cars.

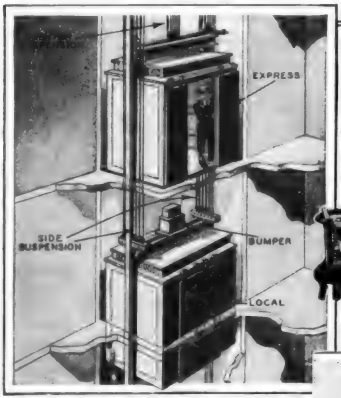
There are fifty-eight passenger cars in the various express and local banks at the ground level, and two cars in the tower shafts. All the ground level cars are designed to travel at the maximum speed now allowed—700 feet per minute—but provision is made in their mechanism to speed them up when and if the law is changed. If that happens the ten traveling express to the 66th floor and local from there to the 80th level will move at 1200 feet per minute. Eighteen serving the floors between 24 and 43 and 41 and 57 will be speeded up to 1000 feet per minute, and another eighteen to 800 feet. Only four locals, serving floors from the first to the seventh, will continue at the 700 foot speed.

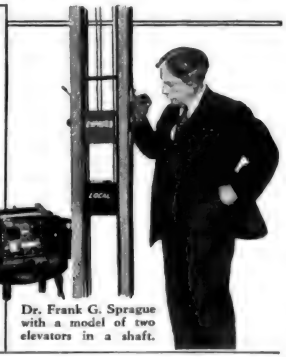
The suggestion of the New York business men that two story elevators, serving two floors at the same time, and two elevators in one shaft be permitted opens up a whole new field of vertical high speed travel. No two



This is how the double deck elevator would work. All floors would be the same distance apart, the decks serving alternate floors as shown above.

Two Elevators in One Shaft Will Speed up the Service and Save Space





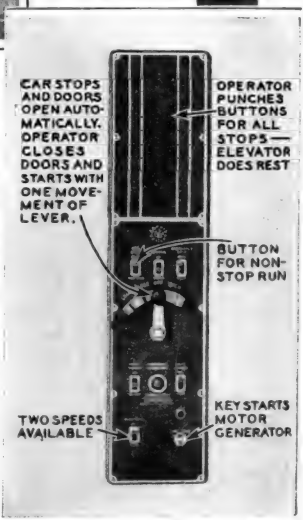
Dr. Frank G. Sprague with a model of two elevators in a shaft.

Placing two elevators in one shaft is not as wild as it seems. While the lower car waited in the basement, the upper would load and run express to the top half of the building, the other would serve lower floors. Note center and side suspension.

deck passenger elevator has yet been built, though two and even three deck freight elevators have been built for garages. And two cars have never been hung in the same shaft. The nearest approach to that is in the Tribune Tower in Chicago where a tower elevator operates directly over a local car, but the local stops at the twelfth floor level and the tower car starts at the 23rd, while the space in between is not an open shaft, but is occupied by offices.

Elevator men have considered several plans for two cars in one shaft. One is to put a pit and safety buffer beneath a tower car, with a machinery floor and sub-floor below for the head of the local shaft. Considerable space would be lost, at least three floor levels, but express cars traveling without stop to the height of the local car shaft, could then deliver passengers to the three or four floors above, and finally transfer the balance to the tower car, which would not have to make the long run down to the ground, and so could better serve the tower floors.

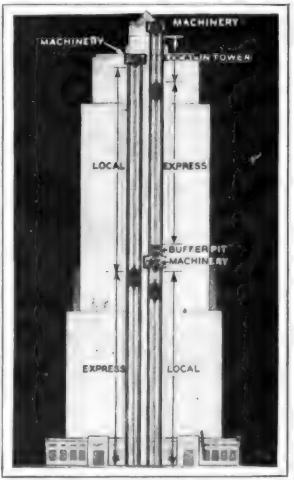
Another idea which the elevator builders are considering is two cars in one shaft, mov-



Operator's panel in a signal control elevator. Everything except starting the car is automatic.

ing independently of each other, but both going all the way down to the ground. That sounds impossible, but, as the elevator builders visualize it, it is quite practical. The upper car would be hung in the usual way, with supporting cables descending down the center of the shaft. The lower car would be hung to a cross beam, supported by cables traveling down each side of the shaft. The local would descend to the basement, while the express stopped at the ground floor to discharge and take on passengers. As the express started upward the local would ascend to the ground, load, and then follow. Coming down the process would be reversed. Safety devices preventing the cars getting too close together or the express car coming down when the local is going up, would be necessary, but they present no particular obstacle. If any city authorizes two cars in one shaft the elevator designers are ready to produce them.

An elevator system of this sort, with two cars running independently of each other in the same shaft, has actually been built and is in operation in the plant of the Westinghouse Electric Manufacturing Company at East Pittsburgh, where it is demonstrated to prospective builders of new skyscrapers. The installation is remarkable not only because two cars run up and down



Another method of running two elevators in one shaft is shown here. This method is already permitted and may be put into service at any time.

A view of the mid-town skyscraper district of New York, showing how the new Empire State building towers above the surrounding structures. These skyscrapers would be impossible without elevators.

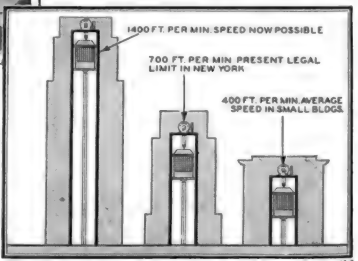
This elevator in the LaSalle-Wacker building in Chicago is the fastest in the world. It is capable of 1,000 f. p. m.

in one shaft, but because the cars are built entirely of aluminum—even to the cross-head beams—with side wall panels of micarta, a lightweight synthetic material used in making airplane propellers.

Safety devices keep the two cars from approaching closer than two floors apart, and also prevent them running toward each other. The express loads at the main floor and starts up, whereupon the local follows it, loads at the same floor, and continues upward. The arrangement is particularly useful in tall buildings, as the division line between express and local service can be shifted up and down to meet customer demand. If there is unusually heavy business, say, between the 20th and 30th floors of a 40 story building the local cars, which normally would operate only to the 20th floor, can extend their runs to the 30th, so that both cars would serve that section until the peak load period had passed.

The double deck car offers problems that are perhaps more serious. One car would stop only at floors with even numbers and the other at floors with odd numbers. A passenger getting on at one level and wishing to get off at the other either would have to transfer somewhere en route, and walk up or down one floor, or get off one floor before or beyond his destination, and take the stairs. There would be an operator in each car, but the controls would be interlocked so that neither could start the car until the other was ready. And, finally, all floor levels in the building would have to be exactly the same distance apart.

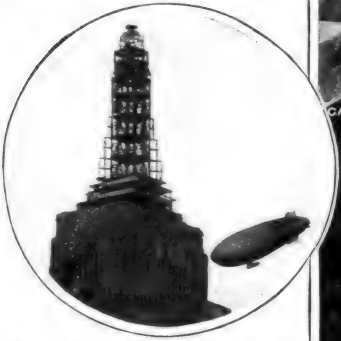
Elevators have developed in the last few years to where they are not only almost human, but in some cases are even better than human operators could be. It was human faults that produced the modern signal control system in which the operator punches buttons before he starts for all the floors where passengers wish to alight, and from there on has nothing to do but close the doors



This diagram compares the present speed in smaller buildings with the maximum now legal in New York City and with the highest speed possible with present equipment.

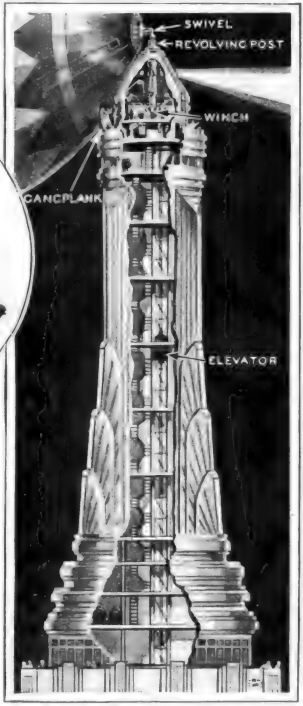
and start the car. It stops and the doors open automatically, and it not only stops for the passengers who want off, but automatically stops to pick up those who want on.

The signal system owes its being largely



A Navy blimp circling the partially completed dirigible mast atop the tall Empire State building.

to the fact that human operators could not think fast enough and make their muscles respond quick enough to catch signals and stop a car moving at 700 feet a minute. With the multi-volt gearless car and the signal system the operator has very little to do, beyond seeing that passengers get off and on safely. Instead of the old fashioned worm gear drive of the hoisting drum, the drum is built right on the armature shaft of the motor. Regardless of the type of electric current available, the hoisting motor gets its power from its own motor generator set, and therein lies its secret, for the voltage can be varied at will. When the operator in the car, or a waiting passenger at a floor, presses the signal button, a selector sets up the necessary contacts on a panel at the head of the shaft. Attached to the elevator car is a steel tape, running over a driving gear which in turn is belted to a screw moving the cross-head of the selector—virtually a small elevator. As the car travels up and down the shaft the cross head moves correspondingly, and establishes the contacts which slow down, stop and start the car. As the car approaches a stop the controller cuts out the driving current



This phantom view of the Empire State mooring mast reveals structural details of the interior.

and cuts in the micro-drive, which, sending a reduced voltage through the driving motor, brings the car to a smooth stop exactly at the floor level.

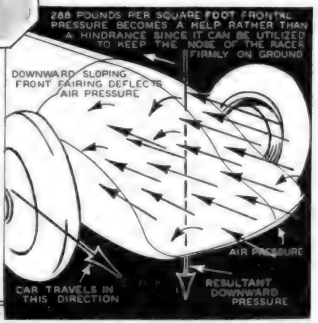
Elevator counterbalances are heavier than the car, by about forty per cent of the maximum load the car may carry. As a result an empty car is lighter than the counterbalance.

(Continued on page 204)

New Cars

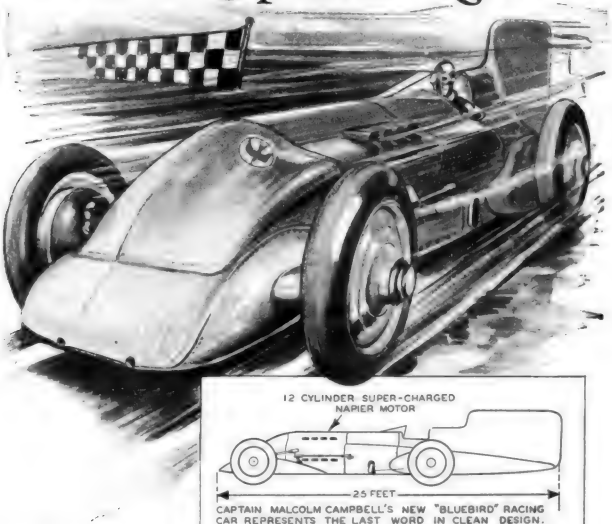
Capt. Malcolm Campbell at the wheel of his Bluebird. He believes his new car capable of a speed of 250 miles an hour, and hopes to beat the present speed record of 231 m.p.h. The diagram at the right illustrates how speed car designers are forced to take special precautions to keep their swift-traveling creations on the ground. The "nose" of the car shown is shaped so that the air through which it travels keeps it pressed firmly to the ground; if the design were reversed to direct the air stream beneath the car, the machine would take off the ground like an airplane and it would be impossible to keep the giant under control. Campbell's Bluebird will have an air pressure of four tons to overcome.

THREE hundred miles an hour is the goal designers of new race cars hope to attain this spring when they put their latest creations through their paces at the world's fastest speed track at Daytona Beach, Florida. Capt. Malcolm Campbell, one-time record holder, is back in the field again with his *Bluebird*, shown on these pages, which he is now bringing to this country in an effort to lower the mark of 231 miles an hour established by the late Sir Henry Segrave. Peter de Paolo and Harlan Fengler are building a car out in Los Angeles powered by two 24-cylinder motors. Norman Smith, famous racing car builder of Syd-



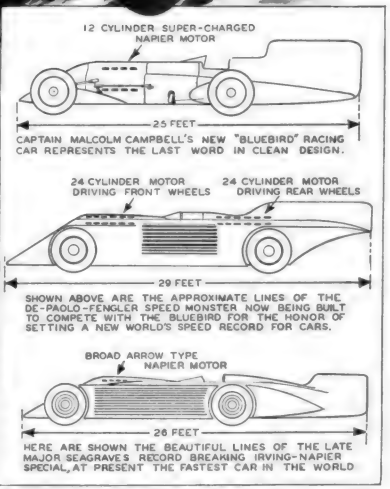
Mechanics are shown putting finishing touches on Campbell's Bluebird. Note the tremendous length of the fin at the tail of the car, to make it possible to steer the giant at speeds of 300 miles an hour. The low-slung lines, leaving a clearance of scarcely two inches between car and ground, are evident in the photo. The special set of 16-ply tires cost $2,500 and can be used at top speed for only a few seconds.

Seek Auto Speed Record



Capt. Malcolm Campbell's Bluebird as the artist visualizes it roaring down the home stretch at Daytona Beach, Florida.

ney, Australia, is constructing a super-speed giant which he says will do more than 300 miles an hour. Smith's car will develop twice the horsepower of Segrave's *Golden Arrow*, being powered by a new engine of enormous speed which the British government has lent Smith on condition that he keep details of its construction secret. Streamlining of bodies is carried to an extreme on all these cars, the pressure of air being used to keep the machines firmly on the ground.



Interesting comparisons between famous racing automobiles.

Condensing Lens Focuses Rays of the Sun for Soldering

The solder is melted quickly by focusing the rays of the sun on it with the nine-inch condensing lens, as shown in photo above.

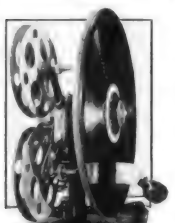
A NOVEL and effective method of soldering was devised by Mr. W. A. Miller, of Port Arthur, Texas, when his regular soldering iron was rendered useless by the failure of the city electric supply. He simply set up a nine-inch condensing lens, as shown in the accompanying photo, focusing the rays of the sun on the wires to be soldered. By this means the lead was melted as quickly as if a red hot iron had been used.

In carrying out the soldering job on his radio set, Mr. Miller found it necessary to use colored glasses to protect his eyes from glare created by the concentrated rays of the sun.

New Compact Talkie Projector

A DECIDED advance in the manufacture of home talkie equipment is represented in a new combined projector and reproducer recently placed on the market. Heretofore the apparatus used has occupied entirely too much space to be practical for drawing room entertainment, but the new device, shown in the photo below, reduces space necessary for efficient operation to an absolute minimum.

This space-saving has been accomplished by the use of a novel turntable arrangement which plays the record while it revolves in a vertical position. The reproducer is held against the record by means of a counterbalanced arm and light tension springs. A small amplifier-speaker unit is available, but the records may be played through the radio speaker if desired.



Compactness is secured in this new talkie projector by means of vertical turntable.

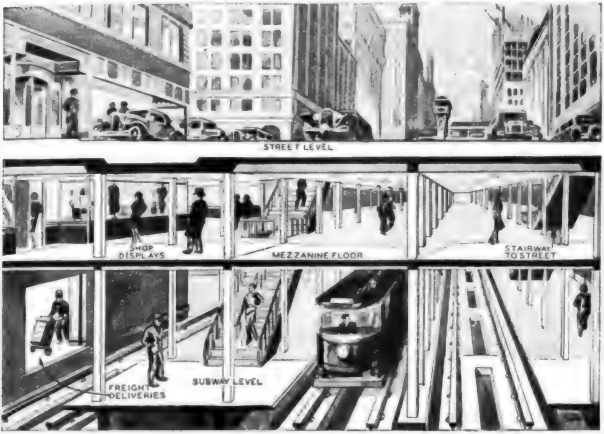
The performance of the machine is in a number of ways similar to the larger theatrical machines.

Sportsman's Headnet Has Window

With this new mosquito head net, which has non-combustible window, sportsmen can smoke their pipes while fishing, as shown in the photo.

FOR use by fishermen when harassed by black flies, gnats and mosquitoes, a head net now on the market has a non-breakable, non-combustible window for providing a clear view. The net is attached to a folding steel frame and will fit any hat.

Chicago Subway to Add Extra Floor to State Street Stores



Stores along State Street, Chicago's chief shopping thoroughfare, will be provided with an extra sales floor beneath the street level, as shown in the above sketch of the proposed plan. Stairs from the mezzanine level lead up to the street and down to the subway, where express and local trains operate.

STORES along State Street, Chicago's famous shopping thoroughfare, are going to grow one story taller shortly, and that extra story will be a new ground floor, with show windows and sidewalks. Providing this extra floor for each store along the street is one of the incidental benefits of Chicago's first subway, work on which is soon to be started.

The engineer's plans call for a two level construction for nearly a mile along State Street. Beneath the street level will be a broad mezzanine with a sidewalk the full width of the street, and stairs at frequent intervals leading down to the subway level beneath, or up to the street. The mezzanine will be continuous for the entire distance from Lake to Congress Street, with store windows lining what is now the first basement level of the State Street shops.

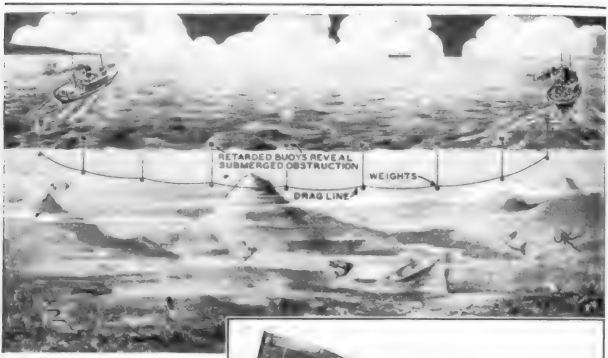
On the lower level the subway loading platforms also will be continuous for the entire distance. Two express tracks in the center will be separated from local tracks at the sides by twenty-two foot wide loading platforms.

Device Ejects Cigarette Stubs

A NEW cigarette ejector recently placed on the market eliminates the necessity of pulling cigarette ends out of your holder. The ejector fits the average size holder, slipping on like a pencil clip. As the cigarette is placed in the holder it is pushed over a small hook on the device. A forward motion on the opposite end shoves out the fag, as shown in the photo below.

Attached to any cigarette holder, this new ejector shoves out smoked-up fags by a forward thrust.

Measuring the Mountains



Surveyors locate undersea mountain with a drag line as shown above.

Equipped with unique instruments for mapping Davy Jones' locker, scientists of the U. S. Coast and Geodetic Survey are fathoming the secrets of the peaks and valleys of the ocean floor. The methods they employ are described in this article.

This is what happens when a ship strikes a submerged rock. The Steamer "Maritana" ran on the rocks in the Eyemouth, England, harbor, and was left stranded as shown when the tide ebbed.

STRANGE and numerous are the "freaks" on the ocean's bottom, located from time to time by the "ocean surveyors" of many nations, who sail out on ships equipped with unique instruments to map Davy Jones' locker from Alaska's snow-bound shores to Hawaii's picturesque coasts.

Giant mountains and valleys of the sea which stretch from a handful of miles to hundreds of miles in length and breadth and sometimes over five miles in depth; mysterious bodies of water with queer habits that seem to follow no established rules of science—such are a few of Father Neptune's odd creations.

Where are these ocean freaks, what are their possible causes, and how and why is Uncle Sam so much interested in their curious formation?

Only the other day scientists of the U. S. Coast & Geodetic Survey found a hitherto unknown valley, or "underwater landmark", off the New England coast. It stretches two miles wide, eight miles long and 300 fathoms below the general level of the continental shelf, according to the findings uncovered in the course of an extensive hydrographic survey which, when completed, may cover some 15,000 square miles of sea area.

There is a good reason to believe that this great undersea valley is part of an ancient river bed which existed in a remote geologi-

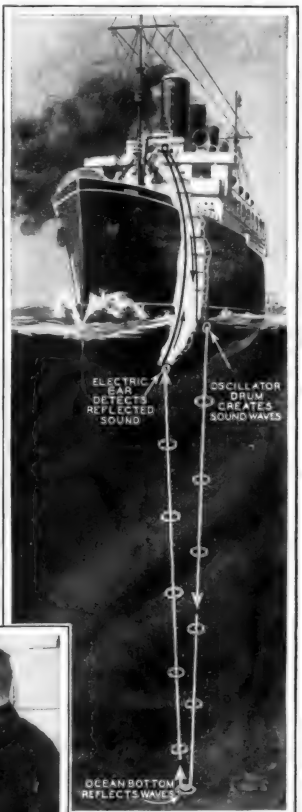
of the SEA

by **CAPT. W. E. PARKER**
U. S. Coast and Geodetic Survey
As told to James N. Miller

cal epoch. But its discovery has tremendous practical importance to America's shipping and fishing interests, for the very good reason that it is right in the path of the westbound trans-Atlantic steamship lane between Europe and the United States. When properly and completely charted, the valley may be used to advantage by sea-going ships to determine their positions when lost in a fog or when the sun is hidden behind the clouds.

Of far greater size and of even stranger shape are what are known as the "ocean deeps". These mammoth-scale troughs, or "holes" in the sea, have always been the subject of science's inquisitive eye, for they commonly are found in regions notorious as breeding places for earthquakes.

Two "deeps" in particular, because they are near American territory, are of interest to Uncle Sam's scientists. These are the Mindanao Deep and the Nares Deep. The first extends in a north and south direction, being approximately 45 miles off the coast of Mindanao, the second largest and most southerly island of the Philippine group. Here Mother Nature has achieved one of the most astonishing and most sudden changes of elevation in the entire globe. Bear in mind that the mountains of the nearby coast rise to a height of some 9,600 feet, while the deepest point in the Mindanao Deep, and likewise the deepest hole thus far recorded in the ocean's floor, is 35,401 feet, or almost six nautical miles (a nautical mile is about a seventh longer than a statute mile). Thus we have a difference of some 45,000 feet, which is 50 per cent greater than the height of the lofty Mt. Everest!



In charting ocean deeps, sound waves are created by the drum on the ship's hull, reflected back and picked up by the fathometer, shown at left.

Findings of "Ocean Surveyors" Are of Importance to Shipping Interests

The most prominent deeps located by ocean surveyors are shown in the above drawings. The Nares Deep, situated off the coast of Porto Rico, is the deepest hole in the North Atlantic. Japanese surveyors made soundings in the mysterious Tuscarora deep up to 32,644 feet, but an accident prevented further soundings. The deepest hole in the ocean floor is to be found in the Mindanao Deep, situated near the Philippine Islands.

The famous Nares Deep at its central point is about 70 miles north of Porto Rico, extending about 180 miles in an East-West direction, with an average width of 40 miles. The Nares Deep is particularly noteworthy for the fact that it contains the deepest hole in the North Atlantic, a depth of 27,972 feet having been recorded by the Navy vessel, U. S. S. *Dolphin*, some years ago.

Larger even than the Nares Deep is the Bartlett Deep, lying 240 miles south of Cuba, and 200 miles directly west of Jamaica. It is about 250 miles long, has an average width of 40 miles, a maximum depth of 3,206 fathoms and runs in an East-West direction, almost parallel to the mountain systems of Cuba and Jamaica.

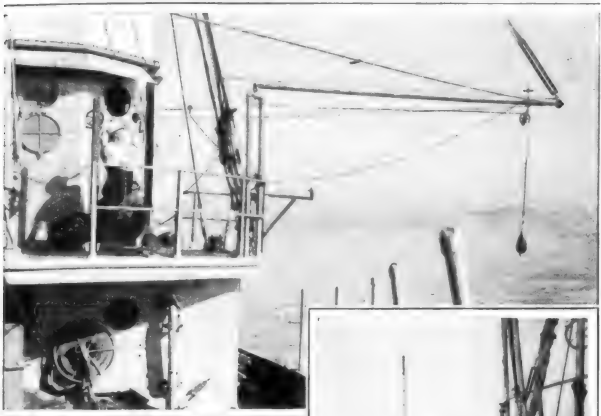
One of the most mysterious deeps on record is the Tuscarora Deep. This deep, situated about 1,200 miles west of San Francisco, has never been mapped thoroughly. Not many years ago a Japanese Survey ship managed to drop a heavily weighted wire to 32,644 feet without striking bottom. This fact by no means indicates that they could not reach bottom in this region, but rather that some accident happened to their sounding wire that made it impossible to continue at the time. However, scientists believe that the Tuscarora Deep is at least 60 miles long, with an indeterminate width and depth.

Aside from the great ocean deeps, scientists of many nations are interested in several other outstanding freaks of the ocean, chief among them being what is known as the "Tongue of the Ocean".

The "Tongue of the Ocean" is very aptly named, being a vast tongue-shaped body of water located amongst the Bahama Islands, in the West Indies. Stretching some 120 nautical miles long and 25 miles wide, its most interesting feature is the fact that the tongue is not a gradually deepening "hole" in the midst of shallow waters, but is a stretch of deep water with depths of 700 to 800 fathoms extending directly up to a coral bank where the average depth is only 10 to 20 feet. This great tongue has a deep water opening of about 30 miles width and a depth of 1,000 fathoms at its mouth.

How would you like to try to measure one of the great ocean freaks? To realize the magnitude of the task, imagine a man with a tape line trying to map the Grand Canyon of the Colorado, which is only a dot on the landscape compared with some of the ocean deeps.

Weights Lowered on Piano Wire Reveal Ocean Depths to Surveyors



Deep sea soundings are made by the wire method with the apparatus shown above. The weight at the right is raised and lowered to and from the ocean's bottom with a powerful electric motor.

How then, you may well ask, do the world's scientists, including those of Uncle Sam, accomplish the gigantic task of mapping the mammoth freaks in the ocean's bed? One of the best known systems is the wire method of deep sea sounding which utilizes an electric motor to reel out a piano wire of tremendous strength. The amount of wire used varies from 5,000 to 6,000 fathoms. To a large cast-iron shot, used for a weight, a detaching rod is fastened so that when the rod strikes bottom the shot is released automatically and picks up a sample of the gravel or sand on the ocean's bottom.

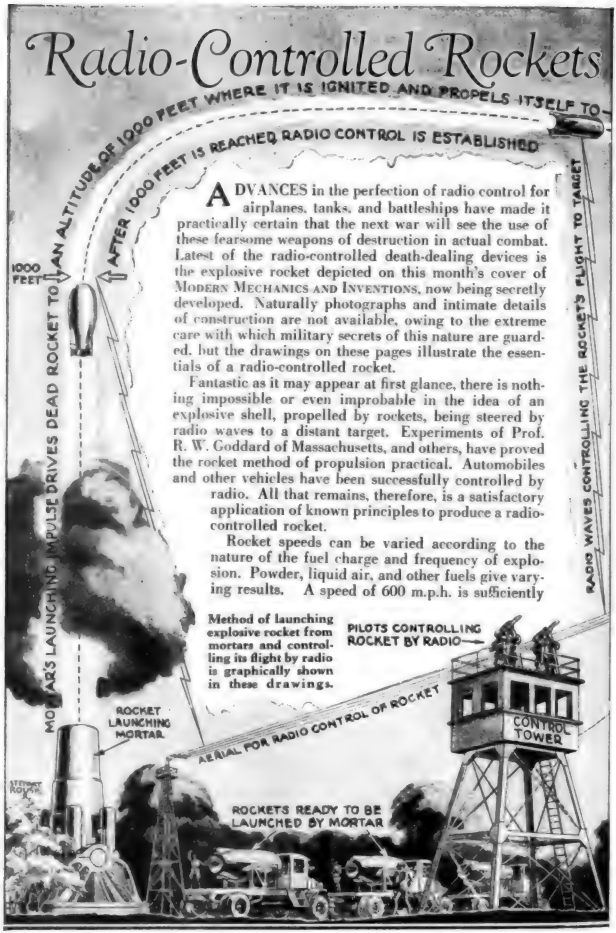
Because of its great weight—65 to 100 pounds—the shot is left on the bottom once the sounding has been made. Quite an expensive procedure, particularly when it is realized that oftentimes to map a single ocean deep some hundreds of shots must be literally "thrown away" in this fashion.

Usually, near the shot there is located a reversing thermometer so arranged, as the name suggests, that when the wire is reeled the thermometer reverses, with the result that when it reaches the surface the "ocean surveyors" have a record of the exact bottom temperature. Summing up, this single sounding operation gives the depth of the water, a small sample of the bottom, and the temperature at that point.

A government ocean surveyor preparing to make a sounding at a supposedly shallow point. He is deftly throwing the weighted line into the water.

(Continued on page 192)

Radio-Controlled Rockets



ADVANCES in the perfection of radio control for airplanes, tanks, and battleships have made it practically certain that the next war will see the use of these fearsome weapons of destruction in actual combat. Latest of the radio-controlled death-dealing devices is the explosive rocket depicted on this month's cover of MODERN MECHANICS AND INVENTIONS, now being secretly developed. Naturally photographs and intimate details of construction are not available, owing to the extreme care with which military secrets of this nature are guarded, but the drawings on these pages illustrate the essentials of a radio-controlled rocket.

Fantastic as it may appear at first glance, there is nothing impossible or even improbable in the idea of an explosive shell, propelled by rockets, being steered by radio waves to a distant target. Experiments of Prof. R. W. Goddard of Massachusetts, and others, have proved the rocket method of propulsion practical. Automobiles and other vehicles have been successfully controlled by radio. All that remains, therefore, is a satisfactory application of known principles to produce a radio-controlled rocket.

Rocket speeds can be varied according to the nature of the fuel charge and frequency of explosion. Powder, liquid air, and other fuels give varying results. A speed of 600 m.p.h. is sufficiently

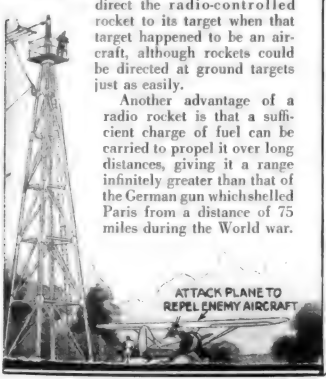
Method of launching explosive rocket from mortars and controlling its flight by radio is graphically shown in these drawings.

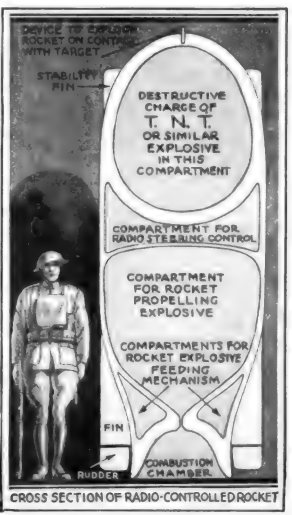
A Zeppelin, difficult for military airplanes to combat because of the ease with which the gas bags attain great heights, would be an easy victim for a radio-controlled rocket, which could be turned around and steered back into the airship in the event of an initial miss. The diagram below gives an idea of the general arrangement of parts of a radio rocket.

slow to enable officers to follow the course of the rocket, and fast enough to render it impossible for a Zeppelin or airplane to dodge it. Mortars would likely be used in launching rockets, in order to avoid danger to ground crews. After reaching a height of 1000 feet or more, the rocket propellant would be ignited and radio control established. Ordinary control fins like those on an airplane would suffice to steer the rocket.

Range-finders or "electric ears" like those employed with anti-aircraft guns would direct the radio-controlled rocket to its target when that target happened to be an aircraft, although rockets could be directed at ground targets just as easily.

Another advantage of a radio rocket is that a sufficient charge of fuel can be carried to propel it over long distances, giving it a range infinitely greater than that of the German gun which shelled Paris from a distance of 75 miles during the World war.

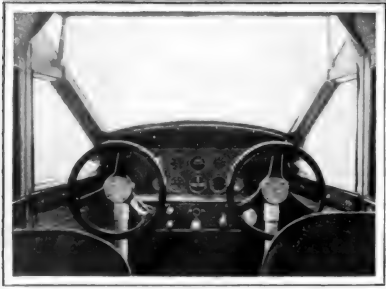




CROSS SECTION OF RADIO-CONTROLLED ROCKET

AIRPLANE versus

A popular type of small cabin plane which the private owner may operate with comfort and economy.



This photo shows the dual controls of a five place cabin plane.

This month Major Arnold compares the privately owned sport plane with the automobile as a means of long distance transportation for pleasure and business. No comparison has been made on short trips, where, of course, the auto is supreme.

NOW that the airplane has taken its place along with the automobile as an accepted means of transportation, it is not amiss to see just what we can expect from it in so far as service is concerned.

Modern airplanes have cruising speeds varying from 105 miles an hour to 175 miles an hour. The sport planes cruise along at 105 to 120 miles an hour, the high powered, semi-racing types press 200 miles an hour, and the mail planes cruise along at speeds varying from 120 to 140 miles an hour. Accordingly it is safe for us to use a cruising speed of 115 miles an hour for airplanes.

Now as to automobiles, it is seldom that a driver is found who averages better than 35 miles an hour for distance covered at the end of a day's run. Accordingly we will take 35 miles an hour for our cruising speed knowing full well that there have been automobiles make as high as 75 or 80 miles an hour on the road, also realizing that there are certain exceptional places where traffic is light, roads are good and wide and there are few towns. Under such conditions autos can and are doing much better than our 35 miles an hour average. Then, too, Hawks averaged 250 miles an hour in his dash across the continent but we will still use our 115 mile an hour average for our comparison.

If an auto and a plane both start from the same point and cruise along for 6 continuous hours, the auto will have reached a point 210 miles away while the plane will have gone 690 miles.

There are now so many lighted airways that it is possible for the airplane to take the air and keep traveling both day and night.

Automobile

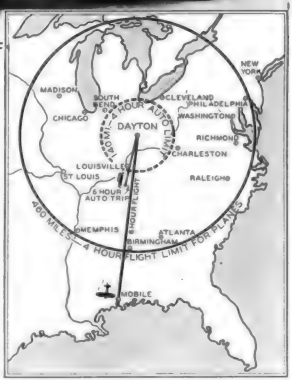
by MAJOR H. H. ARNOLD
U. S. Army Air Corps

A popular American car which is within the same price range as the cabin plane shown opposite.

Let us assume that both airplane and auto start out from Dayton, Ohio and travel west and that the auto does not stop for gas or oil or if it does the time is negligible. With our plane, however, we must stop every four hours for gas and oil. Accordingly we figure a loss of three-fourths of an hour at the end of every four hours' travel of the plane. Therefore, at the end of the twenty-four hours the auto will be at Grand Island, Neb., while the plane will have passed over San Francisco and will be 300 miles out over the Pacific.

Bad weather is not the bugaboo to the airman that it used to be. Planes fly now through rain, snow and low clouds. Accordingly it is safe to assume that there are 200 flying days a year. Actually the air mail operates 350 days in practically all parts of the United States. However, as both planes and autos must go in for repairs and maintenance when they are on regular runs, let us assume that we have 200 working days a year and that we travel for 6 hours every day.

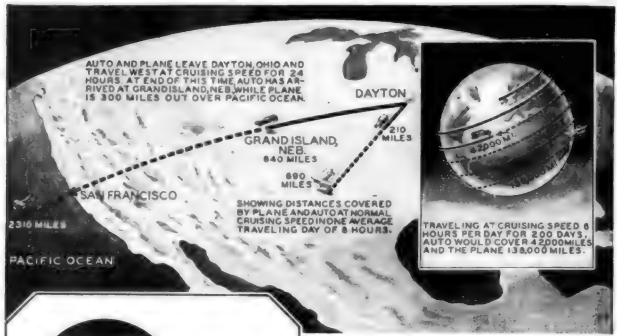
At the end of the year the auto will have covered 42,000 miles and the plane 138,000 miles. Now actually there are very few autos that cover such a distance in a year while there are many airplanes on regular air lines which cover as high as 150,000 miles a year. Furthermore, at the end of the year's run with 42,000 miles in back of it the auto is ready for either the junk man or the second hand dealer. With the airplane it is different.



This sketch compares the radius of activity of the automobile and airplane. The circles compare the area accessible to both auto and plane on typical week-end trips within a four-hour ride.

When it comes out of the shop, it will be ready for another 138,000 miles.

Now compare the radius of activity of the auto against that of the plane. If Dayton is the starting point and both start out traveling for 6 hours the auto will reach a point some 60 miles south of Louisville, Ky., while the plane will have reached Mobile, Ala. For week end trips, assuming that all travel is done in four or five hours on Saturday and a similar amount for the return trip on Sunday, the autoist can reach South Bend, per-



This diagram gives you a graphic idea of the ground covering abilities of the airplane as compared to the automobile. The inset shows the yearly mileage to be expected from plane and auto.

In this age of hustle, more miles and less hours are the goal of travelers. These diagrams show you how the airplane helps you reach that goal.

haps Chicago, Louisville, Charlestown, W. Va., Cleveland and Detroit. Compare that with the airman who can choose between such cities as Milwaukee, St. Louis, Memphis, Birmingham, Raleigh, Richmond, Washington, Philadelphia and New York.

In these comparisons we have given the auto the best of it, for it has been assumed that both auto and plane travel in a straight line to their destination. Perhaps some day there will be such perfect roads but today it is seldom that a driver can arrive at his destination without covering about one-third more distance than the air line.

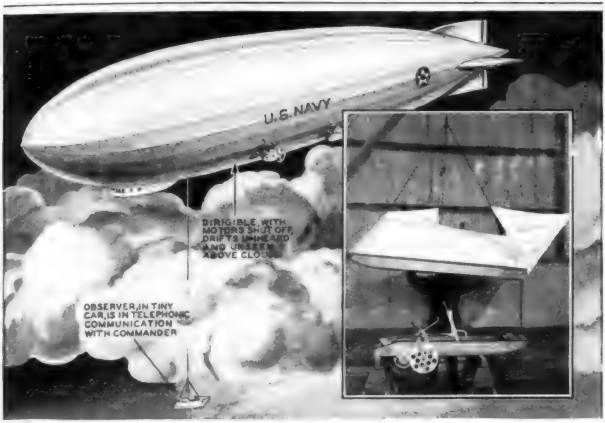
While the plane may be held up by head winds one day, tail winds are sure to average up the flying time sooner or later.

People long since have recognized the limitations of the auto. There are many parts of the United States where even today, all autos stay off the roads for 24 to 36 hours after a heavy rain. Few people take their cars out for pleasure during a blizzard, on icy streets, in heavy fog or when the snow is piled up several feet deep. In the same way people will ultimately learn the limitations of the airplane. They will not expect it to do the impossible.

The time will come when our airplane travel will be treated in the same matter-of-fact manner as that of the auto and train. As the days pass, the public seems to appreciate more and more the advantages that the plane has over earth bound transportation.

In case of necessity the plane can travel through all kinds of weather conditions. Watch the air mail. However, just because it can is no reason for tempting fate. Even railroad trains are sometimes delayed for hours and in some cases stopped altogether by heavy snow storms.

U. S. Army Air Service Revives Dirigible Cloud Car



How the cloud car is used in warfare. The airship shuts off its motors and drifts above the clouds, while the observer in the car watches the ground below. The inset shows a closeup of car and winch.

AN AIR trick filled with excitement is being revived by the U. S. Army and Navy. This is the Cloud Car. The little hanging cars dangling through the clouds from airships safely hidden above, which were first used by the Germans during the World war, are now being perfected and will be put to strenuous use in future wars and maneuvers.

The principle of the cloud car is simple. The airship guides a course above clouds to a place where the enemy is supposed to be, and then floats along with throttled motors while the car containing a super brave aeronaut is cautiously let down. This observer has a telephone and the minute he gets into the clear below the clouds, he begins reporting the situation. If artillery fire is to be directed, the airship above radios the shots back to the batteries. The Germans used this so successfully during one phase of the war that the French thought a spy was in their midst reporting shots. After the air in the World war got so thick with airplanes, however, a big airship could not remain unseen very long over enemy territory and the Germans had to stop the use of the cloud car.

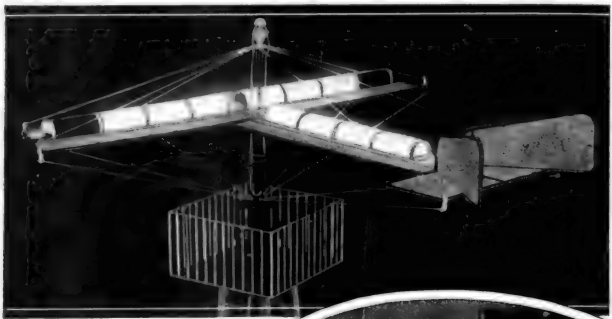
Military experts now believe that for bombing raids and especially for dropping smoke and gas from the air, the cloud cars can be of great value in directing airplanes above clouds to their prey. Airplanes could drop bombs directly through a layer of clouds by direction of the airship with its cloud car observer.

One big advantage of the cloud car is said to be that it is not necessary to lower the observer all the way beneath the clouds, but he may remain up in the vapors just far enough for him to make out objects on the ground, while it is nearly impossible to spot him from the ground.

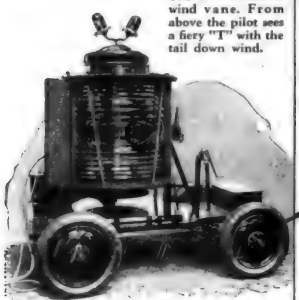
Machine guns are being installed in the cars so the aeronaut can fight off a sudden airplane attack while he is being hauled back to the airship.

The man who rides these cars must have a strong stomach to weather the big swings and the occasional dizzy whirls which the swirling winds at the edge of clouds give the cars.

New German Developments in Airport Lighting Devices



The illuminated wind vane. From above the pilot sees a fiery "T" with the tail down wind.



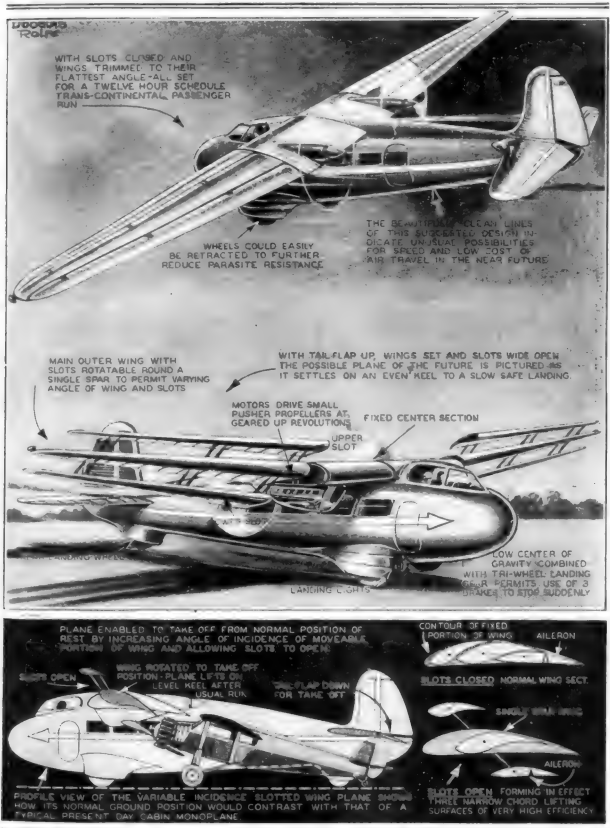
A closeup of the German portable floodlight mounted on its trailer. The lenses are ground so as to deflect the rays downward, so that the pilot's seat remains in the shadow. The dynamo and its motor are mounted on a truck.

A field illuminated with the new floodlight.

TWO much needed aids to night flying have recently been developed in Germany. The first of these is the illuminated wind vane. The old type wind-sock was, of course, invisible at night, and almost so in daylight unless its location was familiar to the aviators using the airport. The new vane, on the contrary, may be seen for miles. It is erected atop a mast where it will be unobstructed by surrounding buildings, and carries a brilliantly lighted "T", with the tail always pointing down wind. As Neon lights are used, it may be picked up in a fog long before the regular landing lights come into view. In the daytime it is easily visible because of the black and white striping on the tower.

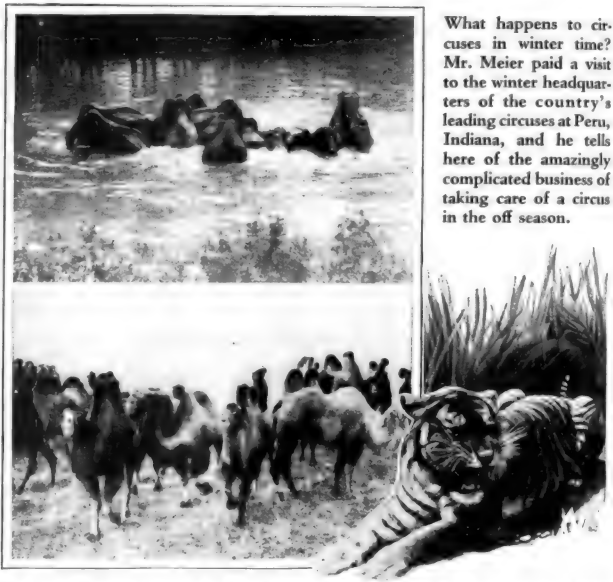
The other item is a compact floodlight of 330,000 candle power, mounted on a trailer, the truck carrying a gasoline motor and 110 volt dynamo. The economy and advantages of such floodlight are obvious.

Single Spar Slotted Wings Next



This drawing represents a well known English aeronautical engineer's idea of what form the future passenger plane should take. The variable camber wing is not yet possible for engineering reasons.

In WINTER QUARTERS



What happens to circuses in winter time? Mr. Meier paid a visit to the winter headquarters of the country's leading circuses at Peru, Indiana, and he tells here of the amazingly complicated business of taking care of a circus in the off season.

Top photo—Elephants bathing in the Mississinewa river near Peru, Ind., re-create a scene out of jungle life. Lower picture shows a herd of circus camels grazing. Tigers, however, are kept behind steel bars.

A MAN with "heebie jeebies" would get very little sympathy down in Peru, Indiana. He could run down the main street, shouting at the top of his voice that he had just seen flocks of camels, herds of elephant, zebra and giraffe, and people would only say—"Well, what of it?"

As winter headquarters these past forty-six years for the leading circuses in America, natives of Peru are pretty blase to the, elsewhere, rather unusual sight of animal oddities calmly browsing in their vacant fields and pastures. It is part of their agricultural income and as much counted on by their farmers as hay and grain is to those in other sections.

But what a shock to the motorist rolling southward from South Bend, to come upon a far-flung, rolling landscape dotted over with animals we usually associate only with African veldts, tropical jungles or zoos! "Never again!" is a perfectly logical thing for most strangers to say.

It is an unforgetable sight when the circuses "limp" in to winter headquarters each fall—their great tents rent, frayed and torn;

With the CIRCUS

by M. W. MEIER

Winter circus headquarters. Some 50 acres are under roof, housing animals, employees, food supplies, and equipment.

Clyde Beattie, animal trainer, spends the winter keeping lions from forgetting stunts, and teaching new ones.

the paint peeling from the gilded wagons; the performers tired and weary and the animals fretting and restless with their premonitions of the winter at hand—and no chance to indulge in their age-old instincts to dig a hole and hibernate!

Small wonder Peru stages an annual Home coming week to welcome the circuses in, for it is then that the town becomes a beehive of industry, making replacements for the spring.

The acrobats, clowns, side show folks and other performers, scurry off to well-earned vacations and plans for new acts for the following season—the topmen and roustabouts go their own unknown ways. But on a small army of others depends the care and housing of the great menageries and the refitting of the circuses for other devastating days on the road next year.

The American Circus Corporation owns 500 acres of land at Peru and leases some 750 more for the purpose of pasturing and raising food stuffs and fodder for their animals and employees. The main tract consists of rich bottomland, picturesquely bounded by the Wabash and Mississinewa rivers. Some fifty acres are under roof and a narrow road winds in and out among the well-kept up buildings, all painted in circus hue and embellished with ornate carvings.

Housing some 400 permanent employees and well over 4000 various animals during the winter months, gives the establishment the aspect and bustle of a small town. There is a headquarters building; a huge "cat"

Elephants Don't Mind Winter; 42 Occupy One Great Stable at Peru

This elephant had to bend his knees to get out of the car door, but he doesn't seem to mind. Circus animals must be numbered among the world's greatest travelers, crossing the continent every season.

house for some two hundred lion, tiger, leopard and panther; a bear house where the temperature ranges from polar to tropical extremes; an elephant stable that would belittle a rajah's and which now houses 42 great beasts; numerous great horse barns; special buildings for seal and other small animals; dog kennels, commissary house, mess halls, bunk houses, club rooms, slaughter house and enormous barns where feed and fodder is stored in unbelievable tonnage.

All around are special buildings housing various machine, harness, regalia, electrical, wagon, paint and blacksmith shops, while interspersed all over the grounds, are various types of training rings ranging from tanbark arenas to impregnable steel cages connected with runways to the main zoo.

In the center of the establishment stands a heating plant and it is an all-important cog in the wheel, for the health of the animals depends on proper temperature being maintained even though zero weather prevails outside. Nor is the pumping station nearby, any small affair.

The daily activities during the winter months almost defy quick narration. The whole equipment used on the road must be overhauled, renewed or else replaced. The animals must be kept in training and taught new tricks. In addition, they must be reconditioned after their gruelling season on the road.

In the wagon shop, dozens of skilled men are kept busy building new wagons and here, they start with raw iron and wood and in the spring wind up with a production of between three and four hundred vehicles ranging from enormous drays to Roman chariots and the ornate gilt-covered wagons we always associate with circuses. Storing that number is a problem in itself but they do it easily.

The machine shop is as modern as ingenuity can make it. There are five huge forges and batteries of joiners, banding and stamping machines, punches, drills and whatnot. Here, axles are made, steel cage bars fabricated and standard makes of tractors utterly made over to conform to circus require-

ments. Horse shoes are turned out here and the quantity is something like the output of a breakfast food factory multiplied by ten.

Circuses carry their own lighting plants and during the winter months, these must be rebuilt and made fool-proof and dependable in the electrical shop. There must be no loose connections or faulty parts when the shows give their night performances. Even a moment of darkness might bring tragedy and perhaps financial ruin.

There are 1600 horses at Circus Headquarters this winter—all white ones, too, save for a few cow ponies and beloved Tony, of motion picture fame. The amount of harness such a stable requires is prodigious. Small wonder the headquarters harness shop rivals huge commercial establishments in size. Here, they take the raw skins and finish them into every item of leather used. From early fall to late spring, the power stitching machines drone far into the night.

Making an ornate suit for a monkey might stump a Parisian modiste but making a French gown is no problem in the headquarters regalia shop. They are used to making anything wearable under the sun, whether a suit for a clown, a uniform for the ringmaster or overalls for an elephant. Thousands of garments are turned out every season and the yards of cloth, bullion tape and trimmings, defies computation. The buttons alone would probably fill the Grand Canyon—the thread easily make a cobweb over the earth—something of that sort, at least!

One would imagine circus headquarters would have its own tent loft and make the big tops and smaller ones. But not so. There is a canvas building, but it is merely a storehouse for new and old cloth. Circus tents are never repaired. Instead, they are replaced. Each season sees them take to the road with every piece of canvas spick and span and new. Used stuff is never taken out. It is junked to the best advantage.

Carpenters, coopers, mechanics, veterinarians, machinists, cooks, animal trainers, steam fitters, electricians, horsemen, farmers—a strange and motley force of experts inhabit headquarters during the season—one and all, playing his part in housing and getting the circuses ready for the coming season!

The farm end of the establishment is a huge undertaking itself. A score of men are required the year round to see that it functions properly, and during harvest time hundreds of extras are employed. This year

Sword-Swallower Gets a Vacation

Sword-swallowers like this one, clowns, and other artists use the winter season to perfect new acts.

they raised 9000 bushels of corn, 2000 bushels of wheat, 1600 of potatoes, 350 tons of hay, 50 tons of cabbage and no end of other vegetables as well as 500 hogs and 200 head of cattle. The bulk of this provender is used in the circus commissary to feed the army of employees. And how they eat!

But tremendous though these figures may seem, they do not suffice for circus needs. Private farmers for miles around the town, sell their output of grain and hay to the corporation. Exactly fifty thousand dollars was spent for outside hay this year and day in and out, the wagons roll into the grounds with their great loads of hay and corn fodder for storage in the lofts.

It is hay, incidentally, which made Peru a bigger circus town than usual this year. The long drought last summer seriously affected fodder crops in the vicinity of the other circus towns in Ohio, Wisconsin, Florida and California. Usually these other cities get a quota of animals to winter care for, but for economic reasons the shows bunched at Peru this year because of the bountiful crops.

Every item of physical equipment owned by the circus is renewed in their own shops during the winter. The big canvas tents, however, are never repaired. New ones are used each season.

Until cold weather sets in, most of the ruminating animals such as horses, camels, zebras, sacred cows, llamas and donkeys, et cetera, are pastured out at so much per head among the farmers for miles around the town. When snow comes, they are all gathered up and warmly housed in headquarters proper. Watching a festive zebra shag a camel over a Peruvian hillside is no uncommon sight nor is the spectacle of 42 elephant calmly bathing in the Wabash river!

How Peru became a circus town is a fascinating tale which evolves around a man more truly a national epic figure than Barnum himself. Back in the early Eighties, (1884) "Uncle Ben" Wallace, then a young man, operated a livery stable. That fall a small wagon circus disbanded in town and asked him to board their lion, trick horse and donkey for the winter. Spring came, but the owners never showed up again and in an effort to get back his feed bill, young Wallace toured the neighboring towns.

Thus, he got his start. The first years are a vivid chronicle of great success and great failure. Gradually his outfit grew and with the years, he became the owner and absorber of other rival outfits such as Sells-Floto, Hagenback and others. Once, a carelessly-flung match landing in a bale of straw utterly wiped out his everything but the following year saw him owner of the biggest wagon show in America.

In 1886 he acquired the first elephant ever to be transported around America. Older readers of MODERN MECHANICS AND INVENTIONS may remember Diamond, as he was called. Barnum had others, but they were kept in New York.

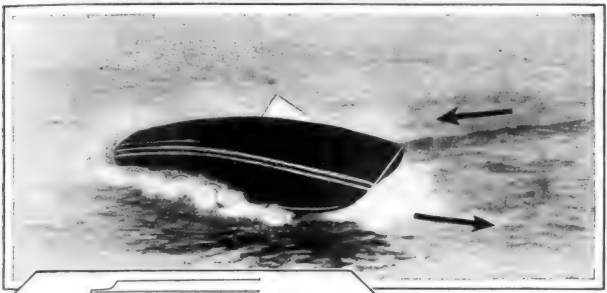
Wallace loved Peru because it was his home town and the domicile of his friends and financial backers. He bought 500 acres of land nearby and gradually improved it for winter purposes. Today the tract contains over a million dollars worth of buildings and invaluable equipment. That is one reason why circuses winter there now rather than in warmer climates.

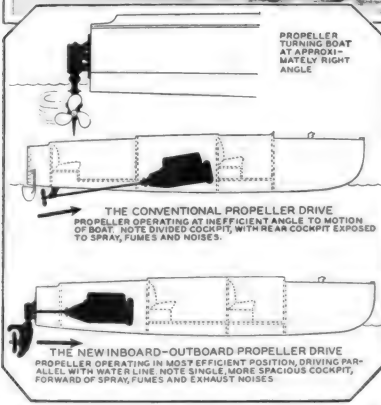
His deposits at the "home" bank grew so rapidly in the old days that the officials refused to longer be responsible for them. Unperturbed, he organized his own bank and it still flourishes today—more powerful and useful to the community than ever.

The Dayton Flood, of 1913, almost completely wiped him out. Six of his elephants and numerous other animals were drowned.

(Continued on page 208)

Inboard Motor — Outboard Advantages





These drawings compare the new inboard-outboard drive with the conventional inboard drive used in the large motor boats.

Right-angle turns like this are made possible with the new drive.

MANY a veteran motorboat owner has eyed with envy the maneuvers of an outboard craft cavorting in shoal waters, driving down streams and inlets where submerged or floating obstacles would have played havoc with even the best protected rigidly mounted propeller. Those who have followed America to the waterways have long appreciated the safety value of the "swing back" feature of the propeller arrangement on outboard motorboats, even though owners have been desirous of larger and more luxurious water conveyances.

Now, however, research has perfected a unique propeller drive arrangement which brings the safety of the "swing back" or tilting propeller to craft with motors mounted inboard. And in addition to safety are new features of maneuverability which give the boat thus equipped all the handiness envied in outboard.

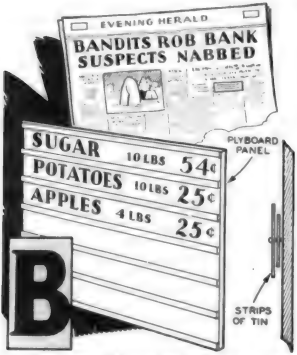
The new arrangement is described in detail at the left. It will be seen that the engine is mounted on an exact horizontal at the extreme stern of the boat. With the conventional propeller-drive arrangement, the engine is well forward and canted upward on the bow end.

Radio Stops When Phone Rings

A SIMPLE device for shutting off the radio when the telephone is in use consists of a switch of the push and pull type mounted on the telephone upright, with the spring actuated top pressing against the under side of the receiver arm. When the receiver is lifted off the arm raises and actuates the switch to shut off the radio set automatically, permitting easier hearing over the phone.

HANDIKINKS

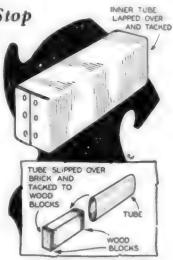
By consulting the pages of this department, you will find a number of stunts and ideas that will be of immense assistance to you in your home, workshop, or garage. Modern Mechanics and Inventions editors are always on the lookout for any labor-saving handikinks.



Sign Letters From News Headlines

AS LETTERS used in newspaper headlines are especially designed for high visibility, they make very good figures for display signs. By cutting out the individual letters and pasting them on pieces of cardboard in the manner shown in the drawing at the left, you can devise a conspicuous and attractive signboard. A margin of ¼ inch is allowed at the top and bottom.—Richard Telke.

Handy Door Stop



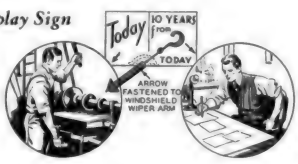
A HANDY door stop that will not mar the woodwork may be made from a brick, two blocks of wood and a piece of inner tube. The wood blocks, cut to the size shown in the accompanying drawing, are placed at the ends of the brick and the inner tube slipped over them. The ends of the inner tube are then slit at the four corners and tacked to the wood ends.—Edward Cass.

Heating Unit on Fan Defrosts Frigidaire Quickly

HERE'S a quick and efficient way to defrost a Frigidaire—a method that saves five hours' time and considerable expense. First procure a heating element from a toaster and arrange it on insulators across the front of an ordinary electric fan, as illustrated at the left. Then remove the trays and set the fan so that a blast of warm air is directed into the freezing compartment and over the coils. In five minutes every trace of frost will be gone.—Patrick O'Brien.

Shield Wiper Animates Window Display Sign

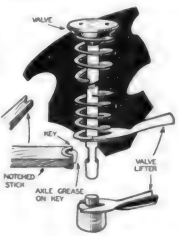
AN ELECTRIC windshield wiper can be arranged in a display window to animate various devices, one of which is shown in the drawing at the right. The mechanism should be concealed, leaving only the arm visible. To this is attached any figure you may desire, such as an arrow, pointer or hand.—Romauld Neiss.



Ideas for the Auto Mechanic

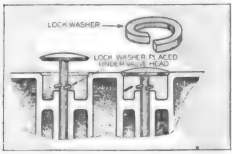
Tool for Placing Key in Position on Valve Stem

TO MAKE a handy tool for guiding a key into a valve stem after you have ground the valves, notch the end of a stick, which should be about ⅜ inch wide and ¼ inch thick, and smear it with cup grease. Then place the key in the notch and, compressing the valve spring with a lifter, as illustrated, slip the key in place. The second half is inserted in the same manner and the valve spring let down.—W. E. Beebee.



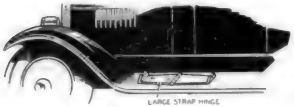
Washer Prevents Exhaust Valve Carbonization

IF THE pistons of your car leak or if an excessive amount of oil is used in the engine, the exhaust valves will carbonize and stick to the guides, causing the valves to fail to seat properly and the engine to miss. This condition can be quickly and cheaply remedied by placing around each exhaust valve a loose fitting lock washer of the type usually used to lock nuts and bolts. These washers can be applied any time the engine valves are removed for cleaning or grinding. The drawing at the left shows the position of the washers on the valve stems. Friction of the sliding washers serves to keep the stems clear of carbon, which may cause damage to your motor.—G. A. Luers.



Battery Mat Makes Running Board Step

SIMPLE and inconspicuous steps to cover the worn spot on your running board may be made from discarded battery mats, obtained from any radio shop. Secure them in the position shown.—Gilson Willets.

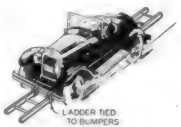


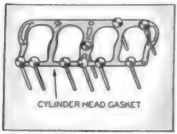
Hinge Makes Stud Plate to Carry Ice

A LONG strap hinge, bent ½ inch from either end, filed to form short blunt studs, and mounted on the running board of an auto, makes an excellent non-skid holder for carrying blocks of ice.—Lester P. Young.

Ladder Carried Conveniently Lashed Under Car

A GOOD way to carry one or more long step ladders is to fasten them to the underside of the car as illustrated in the accompanying drawing. Simply drive the car over the ladders, then get out and lash them to the front and rear bumpers with short lengths of rope.—Theodore Allen.

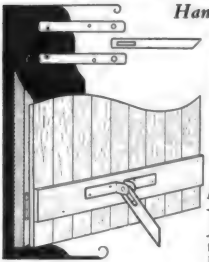




Valve Board from Gasket

IN GRINDING valves in automobile motors, you can make things more convenient for yourself by using the old cylinder head gasket as a valve board. Such a gasket is always on hand the moment it is needed, and the valves can be dropped through the perforations, as illustrated in the drawing at the left, to prevent loss of time.—D. L. James.

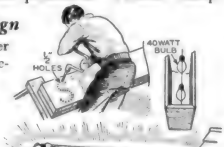
Stunts for the Handy Man



Handy Garage Door Stop From Pieces of Strap Iron

THREE pieces of thin strap iron one inch wide are the chief parts needed to make a serviceable prop for holding garage doors back when open. Two of the pieces are bent at right angles as shown in the accompanying drawing, and have holes punched in them to take a ¼-inch bolt. The finger is slotted and filed to a point, and can be 10 or 12 inches long, as required. To put this finger away when not in use, simply lift it to a vertical position and drop down. To use, reverse the procedure.—William Bishop.

Home-Made Street Sign

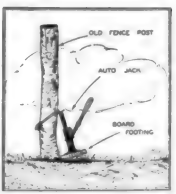


IF YOU are a shopkeeper and cannot afford a factory-made sign, you can build a very attractive home-made one yourself. First two boards of the desired size are outlined with the letters you want on the sign. The next step is to form the letters with a half-inch drill, as illustrated at the right. The letters can then be painted in and the sign wired up, using a 40-watt light every foot or so. By tacking two boards together you can drill both sides of the sign at one setting. A flasher switch will make the device more effective.—Grover Brinkman.

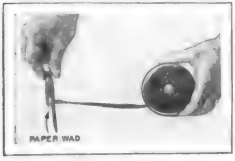
Wooden Handle for Ice Cream Freezer

MOST low-priced ice cream freezers have only a bent rod as a handle. The task of turning such a handle can be made more comfortable by cutting a short piece of broomstick and drilling a hole through it just large enough to fit snugly over the metal handle, as shown in the accompanying drawing. A slight pressure toward the freezer will keep the wood handle in place when turning.—James Warden.

Auto Jack Makes Post Puller



WITH an old automobile jack, a short length of chain, and a small board, you can rig up a puller to root out the most reluctant fence post in short order, with a minimum of time, effort and exasperation. The chain and jack are arranged as shown in the drawing at the right. It is a good idea first to wiggle the post back and forth to loosen the dirt slightly. Then, with a board placed under the jack to give it a solid footing, you can pull the post out of its socket with a few pumps on the handle of the jack. —Douglas Wimper.

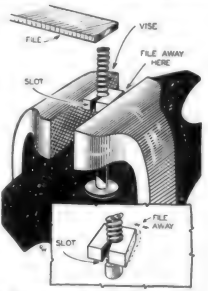


Convenient Stunt for Handling Tape Line

THE eye on the end of the average tape line is difficult to handle with gloves on, and often just as difficult without them. To remedy the situation, cut most of one leg off of a clothespin and slip the eye between the piece as shown, securing it with a slightly wadded piece of paper. This makes the line much easier to handle. —John Hrkal.

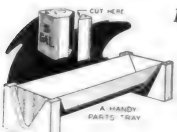
Workshop Ideas to Save Labor

Dressing Bolt Ends Without Injuring Threads



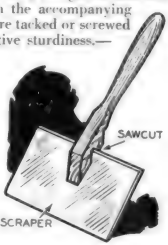
WHEN a bolt is cut off with a regular cutter or a hack-saw, the end is usually dressed and smoothed with a file. But if the bolt is held in the jaws of a vise when the filing is being done, there is danger of injury to the threads. A good way to prevent this is to slot a nut that fits the bolt with an ordinary hack saw and then file away the back of the adjoining side as shown in the drawing at the right. The bolt can then be inserted in the nut and clamped firmly in any shop vise and the bolt ends dressed without injury to the threads.—William Wiseman.

Parts Tray for Workshop

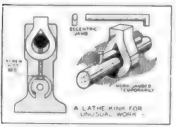


A CONVENIENT container for holding small screws, bolts, washers, and innumerable other small workshop parts may be made from the corner section of a five-gallon can and two blocks with V cuts, as shown in the accompanying drawing. The ends of the can corner are tacked or screwed in the notches of the end pieces to give sturdiness.—Retta Conley.

Handle for Steel Plate Scraper Makes Work Easy



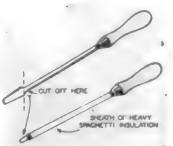
TO PROVIDE an ordinary steel-plate scraper with a handle, cut a piece of scrap wood into the shape shown in the accompanying drawing and saw a groove in it on the underside. With the scraper inserted in this notch, greater pressure can be exerted.—V. E. Johnson.



Here's a Handy Lathe Stunt

IF YOU are using a small lathe without a chuck and want to turn up some large stock, you can solve the problem by jambing a piece of wire with a crank end into the V-neck between the clamp and the stock as shown at the left.—Walter Brixius.

Safety Type Screwdriver for Adjusting a Radio Set

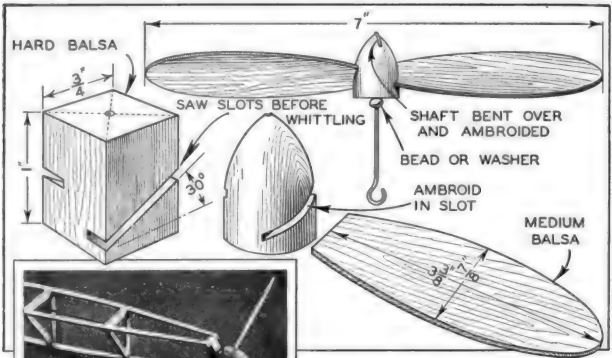


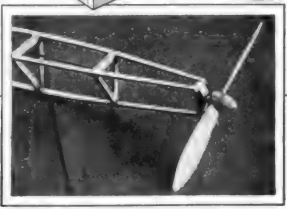
WHEN the bit of your big screwdriver becomes damaged, you can quickly and easily convert it into a serviceable safety adjustment type screwdriver to use on your radio set. Simply grind off the bit, coat the shank with cement, and slip over it a piece of large size spaghetti insulation.—H. C. Singer.

Tire Makes Grindstone Water Container

AN EASY way to provide a continuous supply of water to the grindstone is to cut out a section of old automobile tire and fasten it to the grindstone frame, as illustrated in the accompanying drawing. It should be suspended high enough so that the stone will always be in contact with the water. Of course, it is essential that a piece of tire be selected which does not leak.—A. C. Wilson.

Easily Made Prop for Model Planes





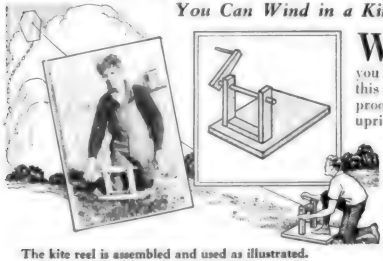
The block that forms the propeller hub is cut cone shaped and the parts assembled as shown above.

HERE'S an excellent propeller for a model airplane that can be built up from three scrap pieces of balsa wood. With a little careful whittling and balancing, it will work as well, if not better, than a prop made from a single large piece.

A small block of balsa, preferably of the hard grade, about ¾ inch square and 1 inch long, is used for the hub and spinner. First drill the shaft hole through the center, with the grain. Then on opposite sides of the lower end cut two diagonal slots to receive the ends of the blades, using a saw blade that will make a slot about 1/16 inch wide. The slots should be set at an angle of about 30 degrees, as shown above.

Next whittle the hub into the shape of a cone, and, after having applied ambroid generously, insert the ends of the blades into the slots. Finally, bend the front end of the piano wire prop shaft in place over the nose of the spinner. This spinner-type hub protects the prop in nose dives.—Hi Sibley.

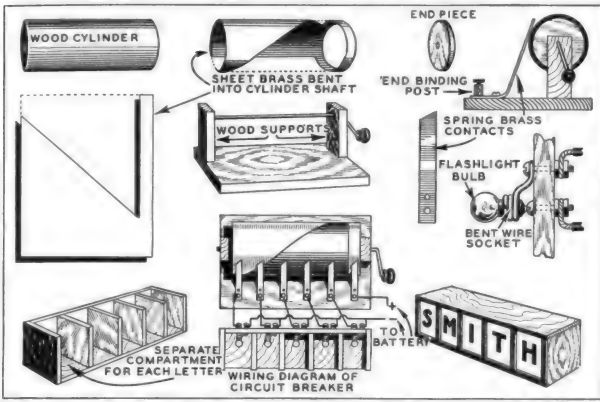
You Can Wind in a Kite Rapidly With This Reel



The kite reel is assembled and used as illustrated.

WINDING in a kite is a tedious and long drawn out task when you do it by hand, but by constructing this simple kite reel you can hasten the process considerably. Simply erect two uprights on a piece of board, and through their upper ends bore two one-inch holes. Through these holes run a short dowel rod equipped with a crank for winding, as shown in the accompanying drawing. In use, tie the kite string to the rod and turn away. —Dale Van Horn.

A Simple Window Flash Sign



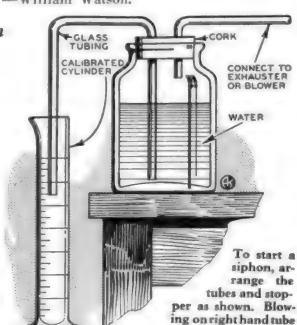
Drawing shows arrangement of letter compartments and wiring and construction of circuit breaker.

A SIGN with letters that flash off and on in a row makes an attractive device for any display window. To construct such a sign, one that is simple in design, build a row of compartments for the letters desired as shown above, and paint the letters on small pieces of glass, to be inserted as illustrated. The circuit breaker consists of a wood cylinder enclosed in a piece of sheet brass cut to the shape shown. This brass sheet rubs against a set of contact points which are connected to the bulbs in the letter compartments. The cylinder may be turned by hand, but if it is to be used continuously, it is a good idea to gear it up to a small toy motor. —William Watson.

Handy Method for Starting a Siphon

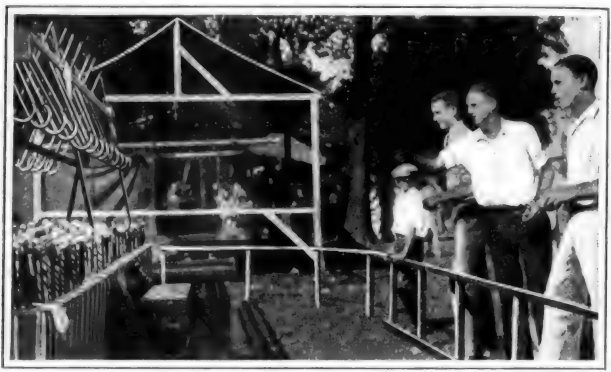
IF YOU ever have on hand the task of siphoning liquid, particularly acid, out of a carboy and don't know any method for getting the flow started, you will find a solution to the problem in this simple scheme. A two-holed stopper and two pieces of bent glass tubing are the only pieces of equipment you will need.

One of the pieces of glass tubing, the U-shaped piece which delivers the liquid, extends well down into the liquid, and the other protrudes down only a fraction of an inch below the cork. With these parts in place, all you have to do now is to blow on the right hand tube. This forces the liquid up through the U-shaped tube and out into the cylinder. When the flow starts, allow the stream to run on its own hook.—Russell Mason.



To start a siphon, arrange the tubes and stopper as shown. Blowing on right hand tube starts flow of liquid.

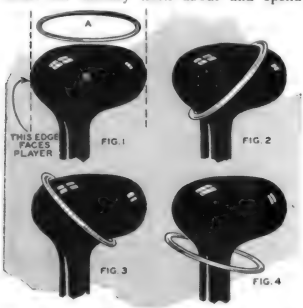
Mechanical Ingenuity Cheats



A typical carnival game of chance. Players are trying to win prizes by tossing hoops over cane handles.

by **LARRY INNIS**

"RIGHT this way, ladies and gentlemen. take a chance and win a big prize. You can't lose," shouts the carnival barker to attract attention to his game of chance, while the unwary flock about and spend their dimes and quarters to attempt to knock down objects that won't fall, to ring pegs with hoops that won't fit the peg, or to throw balls in a receptacle that ejects them as fast as they come.



Pegs used in the "Pitch-Till-You-Win" game are shaped so that the hoops do not fit them, as shown.

In most of these games of chance the chance-taker cannot win because he is pitting his luck and skill against mechanical ingenuity. The best of inventive brains have been used in constructing these devices so that, although they appear to be a sure fire win, they will defeat the player every time.

One of the old stand-by games, which is seen in practically all midways, is called the "Pitch-Till-You-Win" and is played up as a game of science and skill. It does, in fact, require so much alleged skill as to be impossible. The game consists of a number of irregularly shaped oval blocks of various sizes as shown in the drawing at the left. On the larger blocks are displayed the only valuable prizes of the game, so that the player naturally tries to ring these instead of the smaller ones. The player is allowed to pitch hoops until he wins some kind of a prize, but the hoop always rebounds off the larger pegs

Players at CARNIVAL Games

An immense amount of mechanical ingenuity goes into the devising of modern carnival games of chance, which are so cleverly constructed that you can't win, even though they seem to be a cinch. In this article Mr. Innis tells how these devices are made and how operators fleece the unwary with tricky methods.

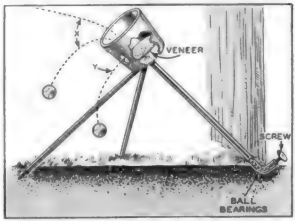
to fall over a small one containing some worthless article.

The secret of this game lies in the size and shape of the larger pegs. The hoop is somewhat smaller than the valuable peg, as shown in the drawing, and naturally will not go over it when pitched on account of the rear shoulder. The operator, to show that the hoop will pass easily over the block, passes it quickly over this rear shoulder, so that the player scarcely realizes how it has been accomplished.

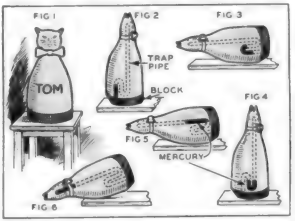
The "Pop 'Em" bucket is another familiar sight along most carnival midways. The device consists of a keg about fourteen inches in diameter and of about the same depth. This keg is supported by a tripod made of pipe and faces the player at an angle of about forty-five degrees. The task of the player is to toss one of three balls into the keg in such a manner that it will not bounce out at the angle X, as illustrated in the drawing, but will roll out the small hole at the side of the keg.

The keg, however, has a false bottom constructed of a piece of three-ply hardwood veneer, and supported by a spring. This bottom causes the ball to bounce out of the bucket, no matter how easily it may be tossed by a player.

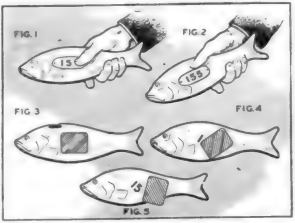
The device is always under the control of the operator and is quite easily "demonstrated." The manner in which the bouncing properties of the bottom are controlled is illustrated in the drawing at the top of the page. The rear leg of the tripod bends up in a U-shape and emerges from the ground behind the wall at the rear of the stand. When the operator wishes to show how easily balls can be tossed into the bucket he gives a secret signal to his accomplice, who then gives the screw a turn, thus lowering the false bottom to its natural position so that a ball



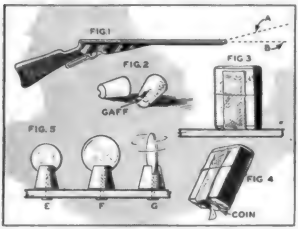
The bucket used in the "Pop 'Em" game has an adjustable false bottom, supported by a spring, which causes balls to bounce back out as shown.



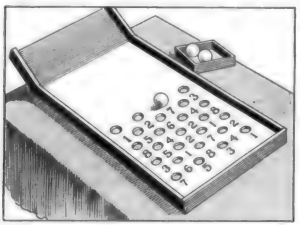
Weighted with mercury, the figures in the "Big Tom" game can't be knocked over. When laid down in demonstration, though, they stay put.



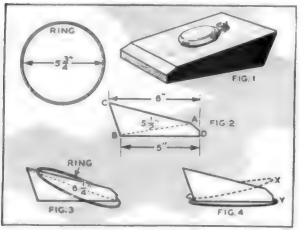
Numbers on the wooden fish in the "Fish Pond" are altered to cheat players as shown here. The operator, when demonstrating, conceals one number, showing prize winning figure, but player draws the full number, which is worthless.



In shooting galleries the cork is placed in crooked or gaffed to give inaccurate aim. Coin targets are set on pivot and only twist around when hit. Cigarette packs are weighted as shown in drawing.



When adding up figures scored in "Roll-Down" game, the operator, counting rapidly, points to any one of the figures about the holes to make the total come out a number that is worthless.



Hoops tossed in the "Watch-La" game are smaller than the blocks, which are shaped as illustrated. The operator, to show how easily ring goes over block, slips it over the rear as shown. The player is unable to compare sizes of the hoop and block.

will roll out the hole. When a player gets ready to throw, however, the operator gives another signal, and the accomplice puts the false bottom in position to fleece the victim.

Perhaps the most popular but most confusing of all the ball throwing games is the "Big Tom," a game in which the player tries to dislodge a figure shaped like a cat. The task looks easy, but for some reason the cat will not fall over, no matter in what part of its anatomy it is struck. The operator always attributes this to the failure of the player to strike the right spot.

"Big Tom" will not fall over, however, for a very good reason. He has been weighted so that he cannot fall down even if struck with a ball that hit him everywhere at once. Figure 2, in the center drawing on the preceding page, shows the manner in which weights are arranged. When knocked down, the weight of the bottom block, plus the weight of the mercury, prevents the cat from completing the arc or remaining in a horizontal position.

However, the operator can easily demonstrate the ease with which the cat falls over by laying the cat down on its back, so that the head falls down lower than the base for a moment. The mercury then runs to the head of the tube and naturally holds the figure in a horizontal position. When the operator stands the cat up the mercury then runs back to the base as shown in Fig. 4. The cat has the appearance of a cheaply made, stuffed piece of canvas, but in reality costs about a hundred dollars.

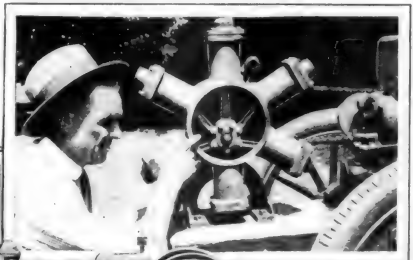
One of the most fraudulent of carnival games is called the "Fish Pond." A number of wooden fish are on display having numbers concealed by a metal cover. The secret of the game lies in the fact that the operator can change the number of the fish selected to a number that yields no prize. Two methods of altering the numbers are used. In one, the operator, when demonstrating, holds his finger over one figure to show a prize winning number; and then removes it to disclose a number that is of no value, as illustrated in Figs. 1 and 2 of the lower drawing on the preceding page.

In the other method the operator demonstrates how easy it is to win by pulling out several fish and revealing the first figures, which is usually a winning number. However, when the player tries, the metal cover

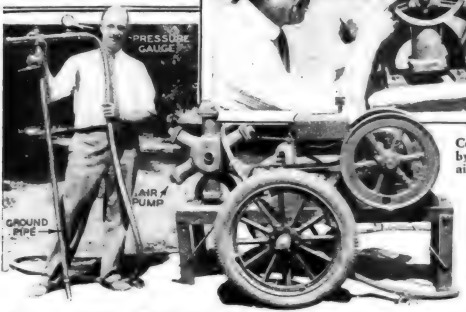
(Continued on page 190)

Compressed AIR Rejuvenates Soil

A MACHINE that renews worn-out soil by the mechanical injection of compressed air into the ground has been invented by a machinist in Covina, California. A revolutionary type of radial air compressor that runs entirely without lubrication, thereby doing away with noxious oil fumes that are detrimental to vegetation, is the key to the engine's success, according to the inventor.



Compressed air is supplied by this 6-cylinder radial air compressor. As lubrication is unnecessary, noxious oil fumes are eliminated.



Air is forced into the soil under pressure through the ground pipe shown above.

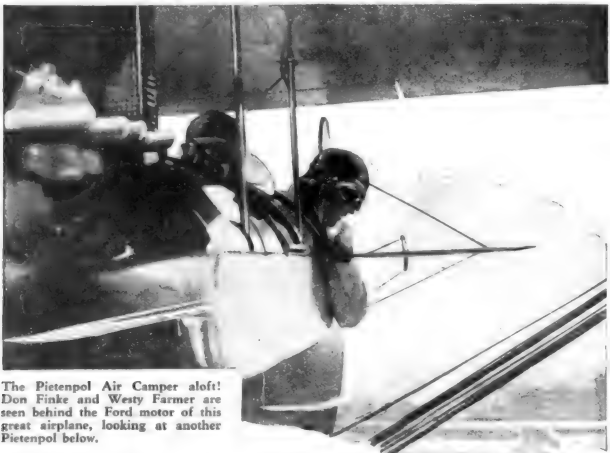
The unit is mounted upon a portable rubber tired cart, as shown in the photos above. It consists of a 6-cylinder compressor, a gasoline power unit, and a hollow injector rod with attached air gauge, through which the air is forced into the soil. A chain from the motor operates a cam in the radial compressor to which the piston shafts are fastened. The wrist pins are bushed with a metal alloy that is frictionless at low speed, and the pistons float on bakelite rings. Through this arrangement lubrication is found unnecessary.

The air enters a reservoir from where it is taken off through a hose coupling and through a hollow pipe. Near the end of this pipe are five 3/8-inch circular holes through which the air under pressure is forced into the soil. The usual pressure is from 25 to 150 pounds per square inch.

Experiments have proved that from three to four feet beneath the surface is the best depth for "aeroculture." as the new method is called. The area of efficient treatment is within a radius of 25 feet from the point of impregnation, which usually lasts from 20 to 30 minutes at one position. The soil is aerated at 50-foot intervals and is entirely a one-man operation. The air pressure breaks up the "hard pan," allowing both irrigation water and fertilizers to penetrate and become 100 per cent effective. The aerator acts, however, as a fertilizer in itself, implanting into the soil both nitrogen and oxygen—chemicals so necessary to plant vitality. An acre can be readily aerated by one person in 1½ days at a total cost of $10 to $12, including labor. The power unit uses only 4 gallons of gasoline per day.

Southern California has been the scene of extensive experiments with this "aerocultor." Citrus groves, orchards, vineyards, alfalfa and grain fields and truck crops are more productive when aerated, it is claimed, and many plant diseases have been cured because of the extra strengthening of the soil. In a test the method has been proved successful.

A FORD-Powered



The Pietenpol Air Camper aloft! Don Finke and Westy Farmer are seen behind the Ford motor of this great airplane, looking at another Pietenpol below.

MODERN MECHANICS AND INVENTIONS is proud to present in these pages the plans for the most remarkable light airplane it has ever been our pleasure to publish. For fool-proof sturdiness, admirable flying qualities, moderate cost of construction, and above all, easy availability of a power plant, the Pietenpol Air Camper two-place monoplane is in a class of its own. Its ability to carry a passenger in addition to the pilot especially recommends it as a practical airplane. It has a take-off speed of approximately 35 m.p.h., a landing speed of 40, and a flying speed of 60-75 m.p.h. Total cost of construction, including motor, is well under $500. The ship was designed by B. H. Pietenpol of Cherry Grove, Minn. No less than five of them have been built, thoroughly testing out the design, and proving it a remarkable performer as a two-place light plane for cross-country flying.

Because the plans are so detailed and complete, it is necessary to run this article in three installments, with a fourth on the motor and its conversion. For those unwilling to wait until the complete plans appear, a full set of large blueprints can be obtained for $7.50 by addressing Modern Mechanics and Inventions, 529 South 7th St., Minneapolis, Minn. Begin now to build this remarkable ship which, with its Ford motor, has a performance between that of the Waco and the Jenny.

2-Seater Monoplane

by **B. H. PIETENPOL**
Designer of the Pietenpol Air Camper

WELL, Gang, here we are after a long wait, and let me tell you I think the waiting will be worth while if what the editors have told me is true. They say they have been so swamped with mail and inquiries regarding this job of mine, over which I have so carefully labored, that something had to be done. You probably remember that it was first announced in Andy's Shop Mail Box last Spring.

They couldn't wait any longer. They said, "Never mind the fussing and pottering. Get yourself satisfied that the ship is okey, and we'll run it in an early issue. You are too conscientious. Experts agree that the job is finished and a humdinger. Let's get it into type and do the job up brown there, too." So we flew up from our home town to MODERN MECHANICS' own flying field, and got "our pictures took."

Gene Shank, Westy Farmer, Harry Holcomb, and others hopped the little sky busters and said they were pretty hotsy totsy. You've been told all this in the Shop Mail Box. And now that I've seen the pictures, I'm willing to agree that the editors can make this the best airplane how-to-build that was ever published if I just do the necessary writing. So here goes:

After many experiments with building and designing light airplanes, after I had first successfully soloed in a *Jenny* at the end of four hours' instruction, after using the biplane and the parasol type of construction, and after using everything from an old Gnome "growler" to an Ace Four and a Model T Ford engine, I came to the conclusion that, (1) the parasol or high wing type was the simplest type of ship to construct—two spars, no center section and just one wing curve jig needed; (2) two people could be flown with the model A engine, which offered the

And here is Pilot Pietenpol flying alone in the Air Camper. The ship is ideal for cross-country flying.

Here Are the Profile and Prop Elevation Plans of the Pietenpol Ship

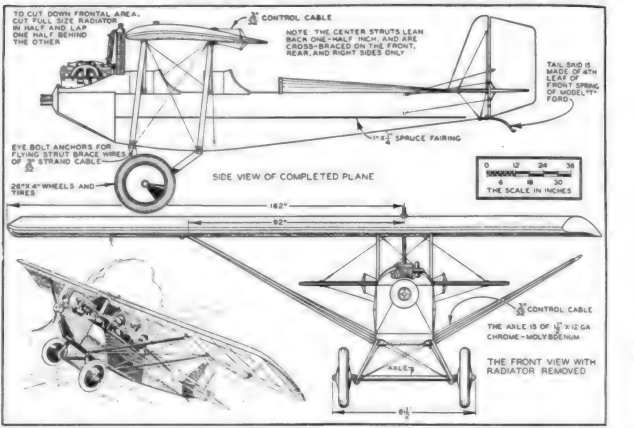


Fig. 1. Here are the outboard elevations and nose elevations of the Pietenpol Air Camper. The two-passenger ship is about a fifth larger than the Heath Parasol, so familiar to Modern Mechanics readers.

most desirable features with the exception of its weight, of any power plant known, and (3) that the De Haviland type of wooden fuselage construction was the lightest and stoutest that could be had at a price within the reach of the average experimenter's purse.

So the design here is the result of a lot of flying, a lot of experimenting, and is as near fool-proof as a low powered airplane can be.

To take up the features of construction in order of their building procedure, let us start with the fuselage, take it apart as a design, and show how to build it. I chose this for the reasons previously stated, and because I had built enough of them to know what they were like. In an early ship, substantially the same size as the one shown here, and which was powered with an Ace 40 horse four-in-line motor, the fuselage came through a crackup without splintering one iota. It was a pleasant surprise to me to be brought to the realization that the plywood would allow the longerons to bust into a hundred pieces with-

SPECIFICATIONS OF THE PIETENPOL AIR CAMPER

Weight of Wing, Complete	95 pounds.
Weight of Motor with Magneto	244 pounds, complete.
Weight of Radiator	21 pounds.
Weight of Propeller	15 pounds.
Total Weight of Ship Without Load	625 pounds with water.
Total Useful Load with which it can fly	385 pounds.
Square Feet of Wing Surface	140
Load per Square Foot	1,080 maximum load lifted.
Span	28 feet, 2 inches.
Chord	5 feet.
Take Off Speed	35 miles, approx.
Landing Speed	40 miles, approx.
Flying Speed	60-75 miles, max., 95.
Weight of Body, Complete	130 pounds.

out splintering. They broke up like a bunch of dead rubber, or artgum, and were badly bent from a pancake landing made twenty feet too high, but there was none of the old toad stabbing so common with the stick and wire type of fuselage. So I went ahead building them stronger, heavier, and perfectly trussed until I got the result that I have here, and which I am showing in the plans accompanying.

If you will take a look at the blue print on page 123, you will see the chief features of the design are a well balanced profile with heavy longerons and heavy bay struts. Don't, for goodness sake, build these any heavier than specified, for the ship as it stands leans very much to the heavy, rugged type, and would fly better, though not be so good for cross-country, if it were lighter all through. I thought it better to err on the side of ruggedness.

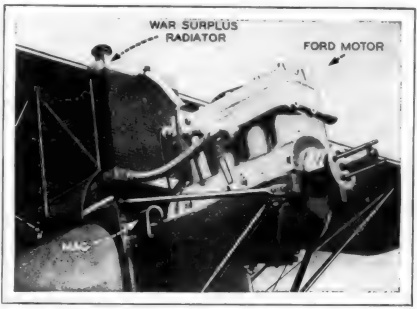


Fig. 2. This excellent view shows the manner in which the Ford Model A engine is installed. No conversion is required—no thrust bearings. A mag is mounted on the end of the fan pulley.

Covering this side baying are the long sheets of 3/32" plywood, or plyboard, as I like to call it. This is laid in cold glue, or casein glue, which you can get in your local hardware store. It is a powdered glue made from distilled milk, or casein, and is mixed in chemically definite proportions with cold water, after which it must be used fresh.

There are gusset plates of the same material on both sides of the fuselage struts and longerons at the points where they join.

The proper method of building up one of these fuselages is to lay the whole side out on the floor full size, and since it must be a wooden floor to take the nails outlining the bends of the longerons, a jig is made up right on the floor and the longerons bent in around the nails. The bay struts are carefully mitered in in their respective positions, and the gusset plates put on.

There is no need to use pressure in using cold water glue. All that is necessary is to see that the surfaces are liberally coated with the stuff, and that enough small brads of about ⅝" length are used to hold the gusset while the stuff is drying, which should be from one to two days. It will set in an hour, and undergo the union with the fiber of the wood and the chemical change which makes it so unusually strong in not more than two hours, but no motion or strain should be put upon it in airplane work for the length of time I have specified. There is no point in using a lot of nailing. The strength lies in the gusset plate and gluing. After the inside gusset plates are on, the whole side is flipped and the 3/32" sheet back to the rear of the cockpit, and the outside gusset plates, are put on.

Then, when both sides have been done, the two sides are lined up and the top and bottom bays are put in. You will note that there is a ¼" floor of plyboard set in *under* the longerons and cross bays of the fore end of the cockpit. The stern plates and the stiffeners are put in, and the whole thing varnished to protect it from moisture. When putting on the plyboard it is wise to paint the edges of the grain with paint. Then there will be no trouble with peeling.

The fittings for the motor mounts and the landing gear will be shown in a future installment.

There is a steel fuselage to be shown later, too. All engineered out to Department of

Here is the greatest piece of practical airplane engineering that it has been the pleasure of Modern Mechanics and Inventions to publish. This shows Don Finke and the author of this article in one of the five Pietenpol ships which the designer has built. The Paragon prop, of war surplus stock, is easily obtainable, as is the Ford Model A engine. The combination makes an unbeatable flying proposition when hooked up with the Pietenpol design.

Commerce requirements by Prof. Wise, of the Mohawk Airplane Co., and while it is a nice job, it will not be easy for some to build. The fuselage I have just described has been used on all five of the ships which I have built to the plans herewith, all alike in every respect, and not one of them has ever had any complaint to offer an owner in service.

So until we come to the details of the fittings, I am going to dismiss the fuselage as having been completed.

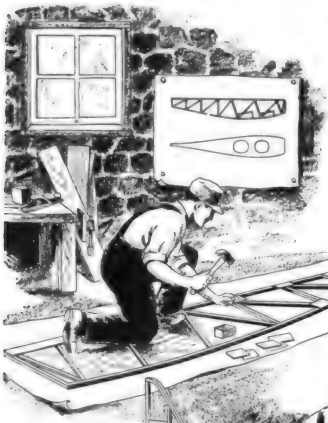
But I should say something about covering. There are some details to come about the fairing and the cowling. There are also a few notes on the fastening of the motor mount. All these affect the covering, and it should be left to the last thing. But when you do put it on, put the cover on in the usual way: make it like a pillow slip that fits on over the job tightly. Make it just a snug fit, and don't worry about a few wrinkles. The dope will take them out.

You will note as you study the plans that there is a fairing on the side of the fuselage. This is to give something of a streamline effect, and it can plainly be seen in the big full page photograph on page 120. Which statement calls to mind one thing that Andy will thank me for: study the plans before you decide they are not clear. They have been checked by experts and pronounced complete. Of course, the full size blue prints done in the scale from which these drawings are reduced are a bit clearer, and I will furnish any of you sets for seven and a half bucks, care of Andy, but those given here are complete and should be studied to enable you to get the whole ship clear in your mind, piece by piece.

I would give not more than four coats of dope to the fuselage, and this should be of the nitrate kind, obtainable from any airplane supply house. More than that number of coats won't do any good, and you ought to give it that many to get it drum tight. It won't begin to be tight, either, until it has had that many coats. The first coat will go on and leave the fabric, which is grade A muslin, looking like a wet rag. After an hour or two it will begin to get thoroughly dried out and to harden the cloth just a little bit, but it will be far from stiff and taut. The second coat will go a long way toward making the fabric this way, and here I would allow the stuff a full day's time before applying the third coat. Then the third and fourth coats could go on the next day. I don't think a pyroxylin finish should be applied. I have found that the solvents used in paints like that soften up the dope and make the whole covering job sag like a sow's ear.

Although the Pietenpol design has flown thousands of miles, it has not been flight tested for stunting except in the most simple maneuvers. Practical pilots who have examined it have reported it amply strong for stunting.

The little job shown in the photograph is painted with an orange made from a standard grade of enamel thinned with varnish. It looks very well and has stood up nicely. I am referring to 77W. Ship No. 899 H is covered with aluminum powder in the dope. This stood up very well. In case your curiosity gets the better of you, let me say that the numbers on the planes are merely file designations and the W or H have nothing to do with anything but the system of



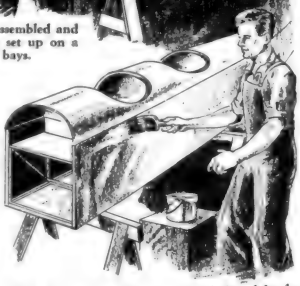
The first process in the building of the ship, if the wooden fuselage is chosen, is to lay the dimensions for the sides down full size on the floor.

filing the numbers at Washington. In this connection, it is possible to get an experimental license on this ship as we have done. It cannot be licensed because, in common with all other light planes, it hasn't got the expensive theoretical engineering required by the Department of Commerce before they will license the ship for commercial flying for pay. I have always maintained though that use was a better criterion than theory. The old *Jenny* couldn't pass the requirements of today!

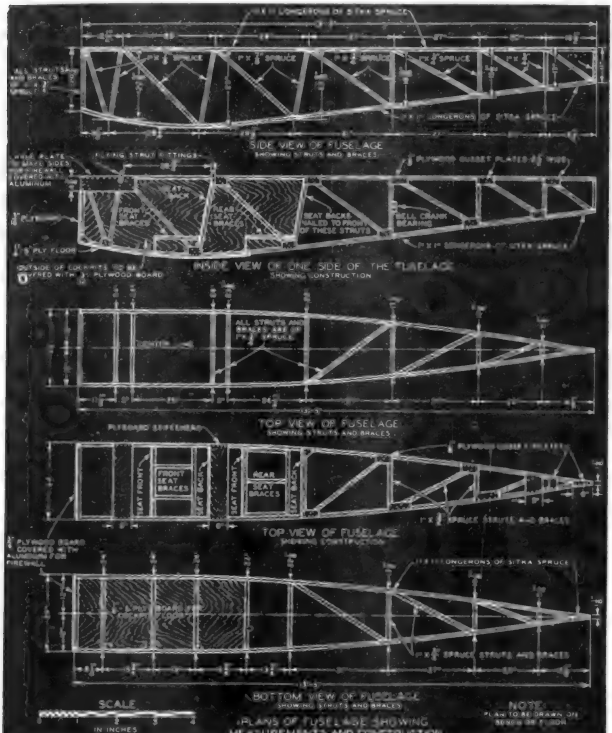
Now about the control system. This is something of my own invention that I am very proud of. By a glance at the last blueprint in this article you will be able to see just how the thing is hooked up. The rudder is controlled by simple U-foot pedals attached to the cross members. The control cables are fastened to the stick at a height I have found by lengthy experiment to give the same aileron and flipper feel that the Waco has. Under the rear seat there is the rudder bar, which has to be used because there is not room for pedals. One long torque tube handles both the sticks, and the torque tube handles all aileron action. The wires run only to the rear stick. The blue print gives complete details, and anything I might say here would be repetition. The boring and drilling and brazing of the collars is so simple as to need no explanation.

This first part, being in the nature of a get-acquainted chapter, is meant to give you a good idea of the ship and something of what is to come. And having told you about

When the sides have been assembled and glued with gussets, they are set up on a horse and joined by the top bays.



Then the fuselage is covered and doped in the usual manner.

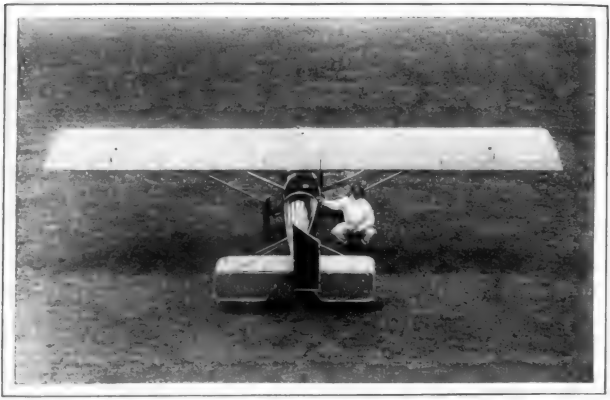


Here are the dimensioned detail drawings of the Pietenpol wooden fuselage as used on all ships built to date. It is a marvel of strength and has withstood unusually rough handling. It is simple to build.

the building of the fuselage in wood, and having shown the plans for the control stick, I am going to close the constructional details and swing back into a recital of the capabilities of this little airplane, sort of giving you a look-see at her characteristics.

All who have flown the job say that she flies about like a *Swallow T-P* except that she is faster in the air. She takes off about like a *Jenny*, climbs about like a *Waco*, and has no trouble at all in handling two passengers. I have used my ship on cross-country work for a long time, and find the motor good for about 200 hours without anything except

This Photo Was Snapped From the Hangar Roof, Giving a Top View



The pilot on the ground alongside the ship is a six-footer, which gives a good idea of the relative size of the plane. The photo was snapped from the roof of Gene Shank's Robbinsdale airport hangar.

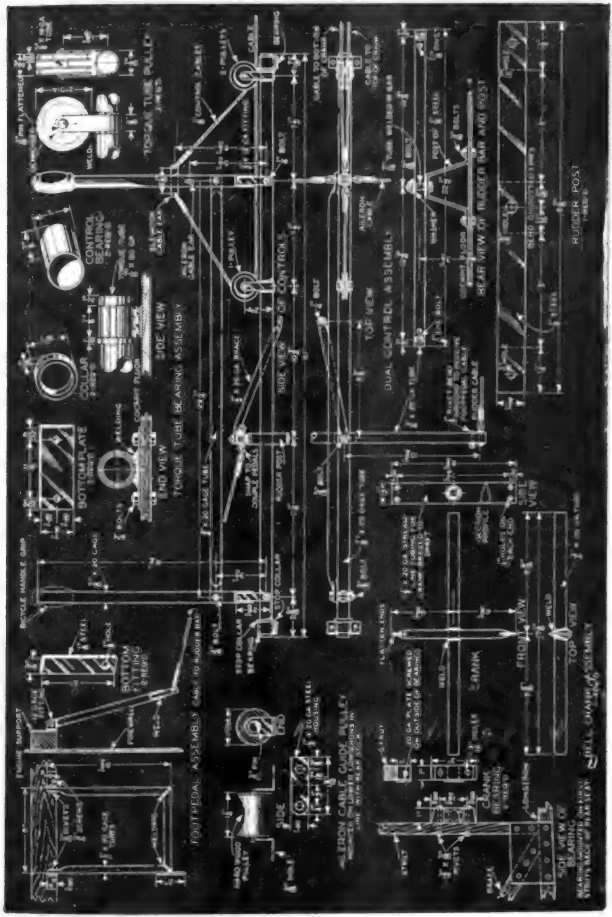
a top valve overhaul and carbon cleaning. The whole engine is so rugged that it needs no nursing, and the prop is of such a size—a standard Paragon prop such as was used on all the Lawrence motors during the war—that the motor turns right around 1600 in the air, which is equivalent to a car speed of 38 miles an hour. This you will agree is not using the motor rough, and she swings the prop all day long at these r.p.m.'s. No need to go higher—the motor won't last as long or be as satisfactory and when you have a motor that is good, why make a good motor bad by overworking it?

The ship takes off with two in a run of about 300 feet, and climbs very strongly. Her top speed is about 75 miles an hour, which is very respectable. We think nothing of piling into our ships at the town in which we live, Cherry Grove, Minn., which is down near the Iowa line, and flying to Minneapolis, 150 miles distant, to be at lunch, flying back the same day.

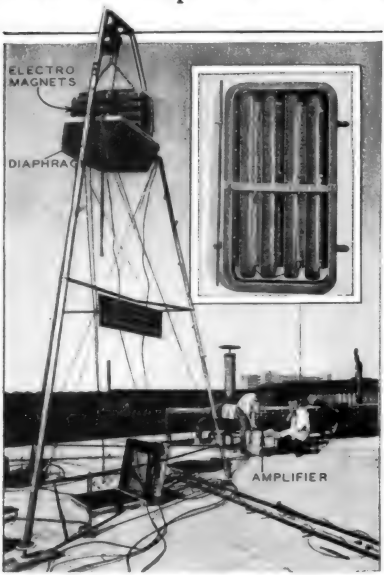
Of course, you've guessed already why this plane of mine is called the Pietenpol Air Camper, especially if you remember the picture Andy ran at the head of his Shop Mail Box column in the March issue. The reason simply is that you can stick a pup tent and a frying pan under the seat, invite your sidekick to hop into the spare cockpit, and let the old crate buzz along for a couple of hours or so into vacation land. That's the advantage of a two-place ship like this—you can carry a pal along who'll be glad to shoot the rabbits, build the fires, and do the camp chores in exchange for his transportation.

Before signing off until next month, I want to put in a word for Andy, who has agreed to help me answer the letters that will start pouring in as soon as this issue reaches the stands. Don't ask him a lot of unnecessary questions until you have the complete plans in your hands. Remember, you'll have to follow the next three issues to get them all, unless you buy a set of blueprints. This is the longest, most complete airplane how-to-build in publishing history, but you'll find every page full of meat and well worth waiting for. I'm not bragging, understand—but I've seen what the editors have on the make, and I'm passing the news along to you.

Here's the Blueprint Showing All the Details of the Ship's Control System



German Loud Speaker Sends Its Mighty Voice 12 Miles



The voice of this giant loud speaker, built by German engineers, can be heard with perfect clarity at a distance of 12 miles. The diaphragm is suspended between four 500-pound magnets.

TO GERMAN engineers of the Siemensworks laboratory in Berlin goes the honor of building the largest and most powerful loudspeaker in the world — so powerful that its stentorian voice can be heard with perfect clarity up to a distance of twelve miles. Mounted on top of the factory where it was built, as shown in the photo at the left, the "Wotan," as the speaker is called, was first utilized to broadcast speeches by members of the International World power conference held in Berlin.

A number of knotty engineering problems had to be solved in the construction of this speaker. The mighty voice is created by four aluminum diaphragms suspended between four powerful magnets, which draw a total of 200 amperes, and weigh slightly over 500 pounds. The test proved dangerous to the engineers themselves, for at a distance of a thousand feet the vibrations are so intense that they can knock a man unconscious.

This new loudspeaker will serve a number of purposes. It can be used to give commands from a zeppelin for landing, to speak between a light house and a ship at sea, but most of all to broadcast advertisements from a captive balloon or airship.

Nerve Impulses Heard on Speaker

REMARKABLE experiments on the nerve of hearing indicate that this nerve operates in a way quite different from the nerve of the eye and other body nerves. Operating surgically on anesthetized cats, experimenters connected the nerve of the ear electrically to an amplifier like those used in radio. Electric impulses coming over this nerve, instead of reaching the animal's brain, were sidetracked into the amplifier. Magnified millions of times, these impulses could be recorded on electric meters or fed into loudspeakers, so that sounds corresponding to nerve impulses were heard by the human observers who conducted the experiment.

Fan Heater Warms or Cools Room

A NEW heating appliance placed on the market consists of an electric heating element cast integrally with an aluminum radiator, behind which is mounted an electric fan that disseminates the warm air throughout the room. The unit is contained in a small cylindrical case, as shown.

This fan heater raises temperature 10° in 10 minutes.

Folding Auto Picnic Table and Bench Will Seat Six People

A NEW type of collapsible table designed for use by automobile picnickers has been placed on the market by an eastern concern. The table will seat six persons comfortably, it is claimed, sustaining a total weight of 1,000 pounds. All of the parts, seats included, are contained in the table top, which folds up to form a box 4½ inches high, eleven inches wide and four feet long, weighing less than 25 pounds.

The table can be erected, ready for use, in one minute, its makers claim. Clamps and straps for attachment to the automobile running-board are furnished. The table is constructed of hardwood with iron rods to elevate the top when set up.

Table, when folded, rests flat on the running board, and does not interfere with door.

The new auto picnic table in use. It seats six people comfortably and can support a total weight of 1,000 pounds. Only one minute is required for unfolding the table and setting it up for use. The top and benches are supported by iron rods.

Bees Have Mysterious Time Sense

THAT bees possess a mysterious power of counting time automatically was proved in recent experiments conducted by an eminent German zoologist. In the test dishes containing food for bees was set out at a given time each day, and a number of bees marked for identification. It was found after several days that the bees returned at the precise time for their feeding.

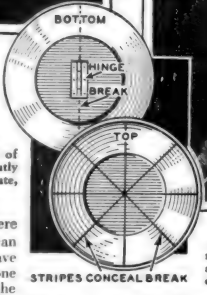
Motorcycle Racer Uses Iron Cone on Back to Give Streamline Effect

Using this iron cone on his back to give streamline effect to his body, Eddie Mayer, famous racer, hopes to break a speed record.

IN ORDER to increase his speed on his motorcycle, Eddie Mayer, well known Australian racer, has devised for himself what amounts to a streamlined body. This was accomplished by arranging an iron cone on his back to reduce the sucking set up by the airless space behind, as shown in the photo at the left. Outfitted in this manner, he hopes to break the speed record now held by the German racer, Herr Heine. Streamlining principles have also been applied to the other parts of his machine to add speed.

JUST for

The practical joker is always with us, but unfortunately for the gayety of nations, he sometimes runs out of ideas. Here are a few joke novelties which are entirely mechanical and which you can make yourself in no time at very little expense.



This trick china plate falls apart when it is lifted from the table, due to the hinge on the bottom. The drawing at the right shows how the hinge is secured with china cement after the plate has been cut exactly in half with a glass cutter and a lot of patience. The stripes, neatly painted on the top of the plate, effectively conceal the cut.

STRIPES CONCEAL BREAK

Here's the explosive match trick. The corner of a razor blade is inserted near the match head and twisted until a small cavity appears. An explosive described in the text is then inserted.

SPEAKING of jokes, here are some that you can have a lot of fun with. Have you ever "bit" on the old one of picking a thread off the lapel of a friend's coat, to find that it is connected to a concealed spool holding yards and yards? Well, here are some more good ones; entirely mechanical so that you needn't possess unusual dexterity to secure a laugh, and you can turn them all out in the workshop in a couple of hours. Then for some fun!

Take the broken plate, for instance. You've probably never heard of it; yet here is a neat little item to call forth the guffaws and put the pep into any gathering honored with the name 'party'. It looks like an innocent, decorated dish loaded down with bon-bons. When the life of the party starts things off by passing the confection around, imagine his embarrassment! The plate falls to pieces. Perhaps it would be better to have a basket handy to catch the candy, but that's beside the question. Anyway, you can use fake candy, if you can carve chocolates out of brown wax. Imagine any one trying to set their teeth in *that!*

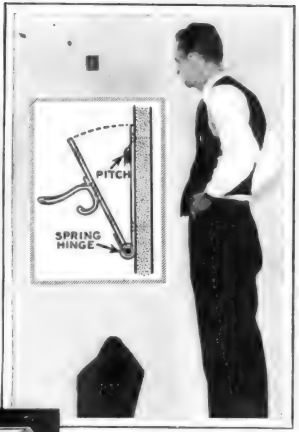
But to get back to the broken dish. Get one at the five-and-ten and then with a glass cutter and some patience neatly break it exactly in half. Then place the halves together and fasten a light and flat hinge to the bottom. Remove the enamel about the spot with a file and the hinge can be attached neatly with some china cement. Run a little of the cement over the hinge, too, and when it is dry cover

FUN

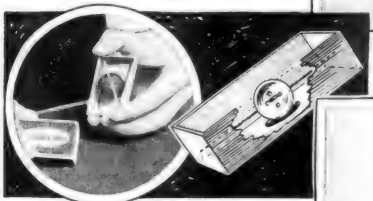
by **Kenneth Murray**

up the job with some white gloss enamel. Place four or five red or black stripes across the diameter of the inside of the dish and a similar narrow band around the edge. If the job is neat it will pass muster as a decorated imported item. At any rate, the important thing is that when any one picks it up it falls to pieces in their hands.

There there is the old but always popular chestnut, exploding matches. You can make them so that the explosive spot near the head is not visible. Take a pinch (and a pinch only) of black iodine crystals and cover them with strong ammonia water in a saucer. After a half hour pour off the ammonia and the paste that is left, when dry, is explosive. With the corner of a razor blade make a small slit near the match head and twist the blade until it leaves a small cavity in the



The owner has scarcely walked away when his coat falls from the trick hanger explained by the drawing.



The above photograph and drawing show you how to make the match box which roars as if it were alive when lifted from its resting place.

Here's a photo of the hot pencil trick. The vial contains weak hydrochloric acid and is inserted into the pencil, mouth up, as shown in the photo.

Ask anyone to write with the pencil, and it immediately becomes hot once the point is lowered to the paper. The drawing shows how it works.

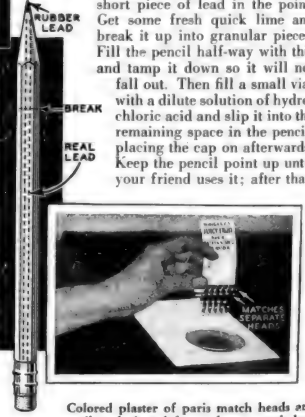
Making a hole in a bottle or the side of a glass is easy if you flatten the end of the needle before starting your drilling operations. Note the wood shaft to hold the needle.

wood. Tamp a little of the paste into this, squeeze the wood back together and wipe off the surface. The slit will then be invisible but the match, when dry, will go off with a bang shortly after it is lighted. The explosive in small quantities is harmless. Don't try to handle it when dry, wash away any remaining in the dish down the sewer, and make up no more than a pinch at a time.

Speaking of matches, try this one. It is a box of safety matches that, when picked off the table, rattles around as if it were alive. Use only the wood boxes and prepare them as follows: In the center of the bottom cut a small hole the size of a dime or nickel and be sure that it is cut in both the drawer and the box. Then fasten a two-inch rubber band, with a button threaded on it, in the drawer of the box so that it stretches from end to end. Twist the button about like you would wind up the propeller of a model plane, then close the box and place it on a flat surface. The button should project slightly through the hole in the box so that on a table it cannot spin around; but let any one pick it up and it goes off with a roar like an airplane.

Getting back to matches, again, have you ever tried lighting one that was damp and wouldn't light? To most people it is exasperating. It also provokes plenty of fun. Soak the wood part of a handful of safety matches in a hot solution of ammonium phosphate. When they are dry, try to light one. It lights all right, but passes out immediately afterwards. Next, run several matches between the rows in a paper of paper matches. Soak the heads in water until they will come off nicely. Then dip them in a thin composition of water, brown water color and plaster of paris. When dry these heads will refuse to light at all, of course, and they are more than amusing when handed to the perpetual match borrower.

Many people borrow pencils as often as matches; supposing you handed a friend a pencil that, as soon as he starts to use it, becomes so hot it is unbearable in the hands? It is a harmless little joke and for it you need a cheap oversize metal pencil such as are sold for a quarter. Remove all of the interior mechanism and cement a short piece of lead in the point. Get some fresh quick lime and break it up into granular pieces. Fill the pencil half-way with this and tamp it down so it will not fall out. Then fill a small vial with a dilute solution of hydrochloric acid and slip it into the remaining space in the pencil, placing the cap on afterwards. Keep the pencil point up until your friend uses it; after that.

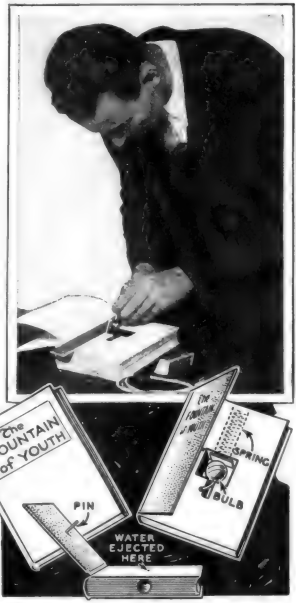


Colored plaster of paris match heads are easily substituted for real ones, and they refuse to light regardless of the patience of the borrower. At the left is shown how an ordinary lead pencil may be fixed up so it will do nothing but exasperate the borrower with its limber lead.

when the acid runs down into the lime, there is no noise but an almost instant heat that causes the studious one to drop it at once.

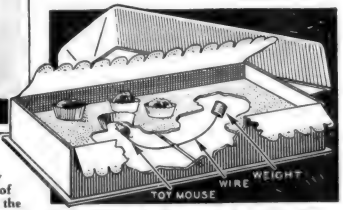
And then there is another pencil joke also suitable for use during a bridge game. Cut away an inch of the point of a wood pencil neatly and cleanly with a razor blade. Break out the lead in the point with a needle, and also a part of the lead in the remainder of the pencil. Glue a piece of round rubber band into the latter, thread the point onto this and with the rubber stretched slightly cement it into the point. Then cut it off excepting a short piece to serve as an imitation pencil lead. If you try to write with it you'll notice two things quickly; that the rubber lead point bends, and that further pressure causes an inch of the point or end of the pencil to apparently break off, although it instantly snaps back when pressure is removed.

Coat hangers are made so that anything placed on them instantly falls to the floor, but with this hanger the coat or cap hangs until the person has turned his back and then they fall with a plunk. Two pieces of metal, japanned black, are used. They should be about 2″x3″ with two of the narrow ends hinged together and fitted with a

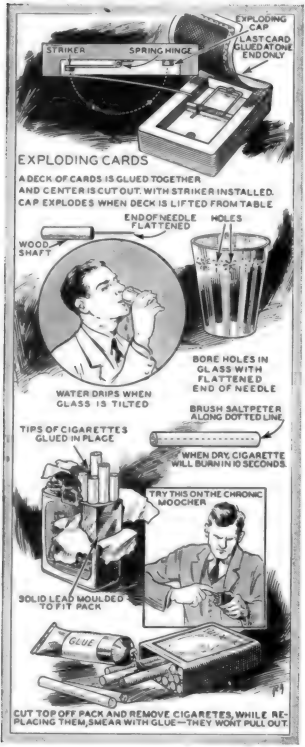


How to turn a book into a miniature geyser. The pages are glued together and hollowed out to fit the simple mechanism. A pin inside the cover, as shown, holds spring until the book is opened.

Imagine the shrieks when the girl friend opens the box of chocolates and sees a mouse staring her in the face. It's all very simple. The toy mouse is swung in and out of the hole by the action of a weight on the crosspin when the cover of the box is removed.



The mystery of the mouse is explained here.



Here is an assortment of tricks which will bring you plenty of laughs. At the top is explained the exploding cards trick which requires no further comment. Next comes the dribble glass which is exasperating if the goat is wearing a new tie or fancy vest. Below are shown three cigarette tricks to spring on the chronic borrower. A saltpeter solution brushed along the length of the fag will cause it to burn up as soon as lighted. Lead, moulded to fit a cigarette pack, will make it unduly heavy, and the glue will give a pertinent hint.

coil spring that keeps them flat against each other. Solder a coat hanger to one metal plate (see drawing) and screw the other to the wall. Between them place a spot of soft pitch. When a coat is placed on the hanger the pitch will keep it hanging for five seconds; finally the pitch will give way and the coat falls. The spring returns the hanger to its original position where it again makes contact with the pitch. In use the performance is continuous.

Have you ever heard of the melting spoon? Popular years ago, it is practically unknown at present. With plaster make a cast of a new teaspoon and when it is dry you can cast perfect replicas with the following easily made metal alloy: Lead, 3 parts; tin, 2 parts; bismuth, 5 parts. Melt them in a crucible and remove from the heat; then add one part of quicksilver. Buff the spoons cast with this alloy until they shine like silver. Give one to the habitual tea drinker. If the tea is fairly warm the spoon will simply crumple up in his grasp and settle in a molten state at the bottom of the cup! The spoons melt at 150 degrees; and of course the metal can be collected and cast over again.

If you want to have some fun with a friend who is all slicked up for a large evening try this trick on him. Sew a strip of black felt around one end of a cardboard tube and over the other end paste some decorated tissue paper. Then smear the felt with soot and tell your friend to look through the tube. When he takes it down there will be a black ring around his eye, unknown to him.

The drawings on this page show a number of other joke novelties that are easily made and capable of much harmless fun. The exploding deck of cards goes off with a bang when it is lifted from the table; an ordinary volume, the "Fountain of Youth," sprinkles perfumed water on whoever opens it. The dribble glass gives a similar impromptu bath to the drinker, as does the trick perfume bottle. And imagine the rumpus raised by the fair sex on opening the box of chocolates, when a mouse pokes its head back and forth from between the bon-bons! The three cigarette jokes consist of (1) the cigarette that quickly burns to pieces when lighted, (2) the pack that is heavier than a cigarette borrower would possibly surmise and (3) the pack of cigarettes that, glued together, are extremely difficult to remove from the package.

Atlantic City Successfully Stages Indoor Football Game

ELECTRICAL engineers made possible the playing of the first indoor football game in the vast Atlantic City auditorium. The 20,000 thrilled spectators had no difficulty in enjoying the night game, thanks to the use of a white football and the powerful lighting system which assured the best visibility. A battery of more than 600 floodlight projectors, spaced 14 feet apart in the trusses arching across the curved ceiling, poured artificial light down on the large field.

Engineers transported 48 cars of dirt from the interior of New Jersey to provide an earthen playing field.

Twelve hundred tons of earth were used in preparing this field.

Machine Paints Golf Balls

Ball is lacquered and returned in two minutes.

THE above photograph reveals a dime-in-the-slot machine which gives a new finish to old golf balls, returning the pellets dry in less than two minutes. The machine is weather-proofed for outdoor use at golf clubs.

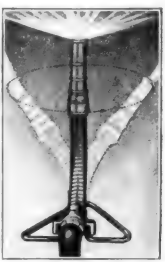
Rays Identify Old Paintings

SCIENTIFIC methods of art criticism developed by laboratories attached to the Louvre promise to relegate professional art critics to obscurity in favor of ray machines and physicists to operate them, according to the French Society of Electrical Engineers.

Every great artist of the past was in the habit of using pigments mixed in definite ways. These pigments, methods of mixing, methods of application and the like usually differed from one artist to another. These differences can now be detected with scientific accuracy.

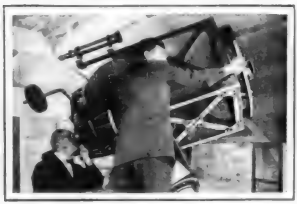
Flexible Neck for Garden Hose

PATENTS have recently been applied for on an article known as the Flex-Nek nozzle holder. This device converts the nozzle of an ordinary garden hose into a handy sprinkler. The nozzle can be adjusted for a sod-soaking downpour or a gentle mist, and it stays where you put it, according to claims of the inventor.



This flexible nozzle holds firmly in any position.

Telescope Designed Especially for Astral Photography



Professor Ritchey at the eyepiece of his telescope.

THE new type telescope illustrated at the left was built by Professor G. S. Ritchey, designer of the world's two largest telescopes. It was recently mounted in Valliere, Montefontaine, France, and will soon be shipped to the United States, where it will be set up at Miami, Florida, for astral photography.

This new scientific instrument, known as the Ritchey-Chretien twenty-inch telescope, differs from most of its predecessors of like power in the extreme shortness of its tube, having a length of only 54 inches as against the 32-foot tube found on the modern refractory telescopes of like aperture.

The mirrors of the new telescope have been ground and corrected especially for celestial photography, and for the first time in history, photographs that are microscopically sharp over the entire area of the photographic plate may now be made. These mirrors will be as revolutionary in telescopes as the anastigmatic lens is in photography.

The compactness of the telescope allows quick focusing and following of fast moving bodies, while its field and images are better and sharper than the old type.

New Aids for the Tree Surgeon

TREE specialists of the U. S. Department of Agriculture have recently announced two new methods of saving diseased trees through the injection of chemicals.

In the first method a notch is cut completely around the diseased tree and covered with a rubber bandage, forming a waterproof connection. Glass jars containing hydrocyanic acid are then fastened to the trunk above the notch. Short pieces of rubber hose convey the poison from the container to the bandage, where it is injected into the sap and distributed uniformly throughout the tree. Insect pests such as the southern pine beetle and other bark beetles are controlled in this unique and efficient manner.

Above is shown the method of placing the rubber bandage and acid jars. At right is shown the simple equipment needed for inoculation by the grease-gun method described here.

It has also been found that a grease gun such as may be found in the tool kit of any automobile makes a good instrument for injecting chemicals into trees. The only fitting that will need to be added to the regular Alemite gun is a brass tube having one end threaded to receive the Alemite bearing and the other cut to form a wood screw. A brace is used to bore the hole in the tree. This apparatus has been used to inoculate for fungus cultures and to control tree borers.

How to Build "Gannet"

Here's what your boat will look like when finished. It will be found ideal for cruising and fishing.

by CHARLES H. HALL

Here are the rest of the plans for the sturdy little Ford powered cruiser. This boat is the acme of economy, both in building and operation; with these complete plans, will be found easy to build for anyone at all handy.

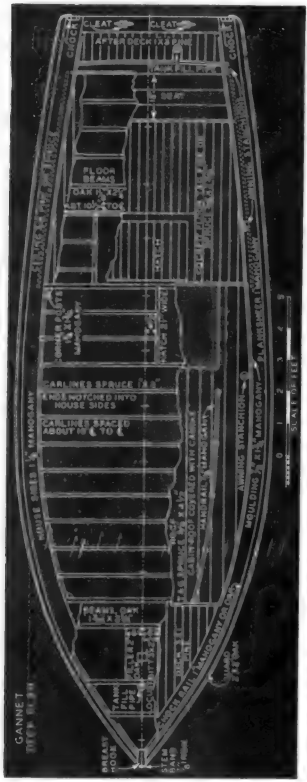
Part II

LAST month we finished the hull of our sturdy little cruiser and were fitting the engine bed. Of course you've had no trouble picking up a Ford motor, but converting the job will be something else again.

The simplest solution to this problem will be to buy a set of conversion parts from a company which specializes in this type of work. Such a company is the Barker Factory, Inc., 123 Crescent St., Norwalk, Conn. With a set of their parts, a wrench and a screw driver, you can make your old Model "T" or Model "A" into an efficient marine engine in no time at all.

Now that this is settled and the planking is on and fastened, the deck is in order. First get out the planksheer. This will have to be made in two or three pieces, with well made "airtight" joints between them.

Lay out the joints, one just abaft the forward end of the cabin trunk, the other abaft the after end, and clamp the boards to the beams. Then mark the outer edge and run the inner edge parallel to it. Scarph the ends together and if you feel skillful, edge bolt them after they are on. But make nice tight joints. Fasten to the beams, counterboring for plugs, and plane the edges to a fair curve. Now fit, on every other frame, the little brackets that hold up the inner edge of the planksheer. These may not be absolutely necessary but they are a good thing to have in the boat. Fit the filler along the inner edge, taking care that it has the bevel needed to give the sides



Here's the deck plan of the "Gannet," drawn accurately to scale. This plan gives you the construction details of the cabin roof, the decks, cockpit and hatches. Many of the deck fittings are also indicated here. This plan should be continually referred to while reading the text in order to properly visualize the various details of construction. Compare this drawing also with the full size cabin plan which you have already laid out.

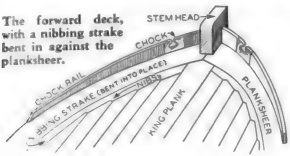
of the trunk a little tumble home. If you make the cabin sides truly vertical they will appear to lean out and will be unsightly so have them set in as shown. Fasten the filler well to the planksheer and then fit the facier along the inner edge.

Now for the deck. This is made of tongued and grooved stuff and the strakes are laid fore and aft. Lay the center one first and work out to each side. You can blind-nail it or nail and plug. Make good joints with marine glue as there will be no canvas over it and you want it to look shipshape. Keep the strakes fairly narrow so that they will not curl nor shrink.

Planksheer and cabin trunk may be made of pine but it will be well worth the small extra expense to make them of mahogany, either Philippine, Mexican or African. It will add a lot to her looks and give a touch of color that will be attractive. Mahogany sounds expensive but there isn't much of it and the added cost will be a small item. Use mahogany plugs, of course, and finish with varnish. Take care not to scar it while you're putting the engine in and so on. It might pay to cover it up with a few old boards until you're ready to scrape and varnish.

If you want a little better looking forward deck, it may pay to lay a mahogany king plank in the middle, wide enough so that you will have some wood left in it after you cut out for the bitt. Then lay the deck with narrow strakes, fasten and caulk, filling the seams after caulking with yellow or black seam composition. You may also bend in one strake next to the planksheer and nib the straight planks into that so that you won't get any "shim points". That is, the ends of the planks, instead of running out into long, skinny points which would be chewed up when you start caulking are notched into this nibbing strake and have their ends cut off with an inch or so of width. Look at the sketch.

Fit the partners for the bitts before you lay the deck plank. These are of oak, the depth of the beam, and are fitted tight between the beams and fastened to them. They support the deck against the pull of the cable on the bitts when at anchor in a breeze of wind. These bitts are preferably of locust and must fit tight in the deck or king plank and be tenoned into the keel. The end of the stem knee fits against the forward face and a block is fitted between the after face and frame No. 2.



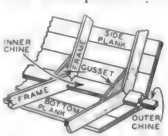
The forward deck, with a nibbing strake bent in against the plank sheer.

The little after deck is shown with a narrow plank sheer run athwartships and then fore and aft planking like that on the deck forward. You may, if you prefer, make this after deck of mahogany, run athwartships in three strakes. Don't try to get it out of a single wide piece as it would not stand but would shrink and curl up after a time.

Next in order is the cabin trunk and this had better be of mahogany to give some class to the boat. The sides are probably too wide to get out of a single piece so frame them up with sill, plate and stiles. The sill or coaming is fastened to the filler on deck, and then fastened with screws from below. Take great care to get a tight joint at the deck for a leaky house is an abomination. You'll have to spile for it and take plenty of time to get the shape and the bevels exactly right before you fasten it down. The plate, or top piece, will have about the same shape as the sill. These two members are ploughed and the pieces between the windows are tenoned into them, making up the joints with marine glue. The forward end of the house is built in the same way but the after one may be staved with tongued and grooved stuff running vertically. This staving need not be of mahogany. The windows have a curve to them.

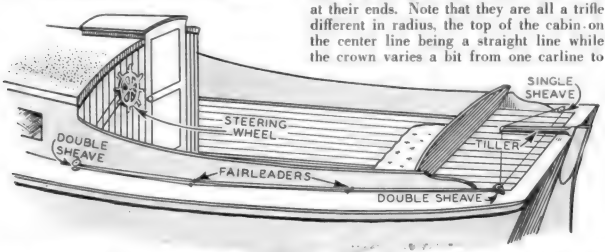
If you are where you can get bent glass, use that but if not use the same heavy celluloid that the aeroplane folks use. The windows may be fixed, as shown, but the cabin may then get hot or stuffy so that it will be better to have them open. The sash must be inside and must fit against a rabbet all around so that rain will not beat in. Perhaps the easiest thing is merely to hinge them on the top but a "jump rail" will make a better job. This rig has a strip along the bottom frame, outside of which the window fits when it is closed. To open, the sash must be lifted over this rail and then swung up. The hinges may be on a strip about $1\frac{1}{4}$" wide which slides up and down between guides, or special hinges may be used. These have the pin projecting into a vertical slot with a thumbscrew to lock it down.

Be sure that the top of the plate is a fair curve and stick as close to the plans as you can. If you make the house any higher, you won't gain much in the way of headroom — there's 5' 3" now — and you will do a lot to make the cabin look like a dry goods box. The rake as given on the plans is plenty; don't give it any more but don't make it straight up and down or you'll spoil her looks.

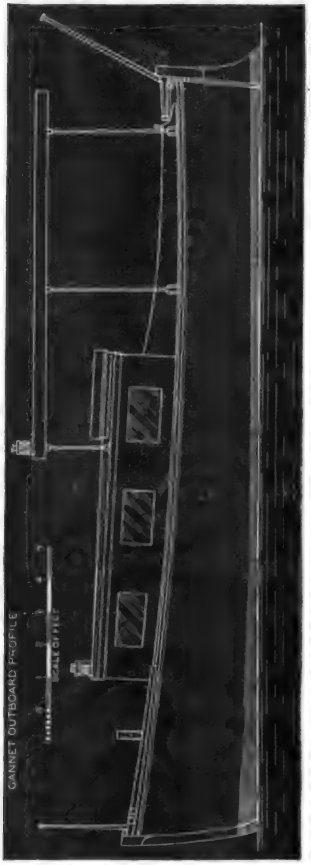


The upper corner of the boat, with one of the little brackets which help to support the plank sheer.

The carlines for the cabin top are sawn to shape and may be either arcs of circles or a little flatter in the middle and a little rounder at their ends. Note that they are all a trifle different in radius, the top of the cabin on the center line being a straight line while the crown varies a bit from one carline to



With this drawing, together with the descriptive text, you will have no trouble rigging the tiller.



Here's the outboard profile. By comparing this with your full size laying-out plan of the inboard profile you will get the canopy dimensions.

the next. When the top of the house side is planed to a fair curve, clamp a straight edge to the proper height on the center line and measure the crown of each carline. If you want to be real fussy, you may taper them a trifle at each end though this is hardly worth the trouble involved. The ends of the carlines fit into notches cut into the top of the house plate and should be set in marine glue or thick white lead.

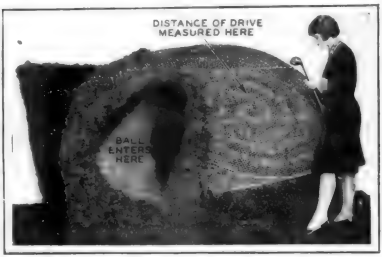
Now cut the beams in way of the companionway aft and fit a fore and after or header on each side, notching them into the last full length carline. Now lay the house roof, starting in the center and working outboard. Get the joints tight and set the nail heads down below the surface. You can't have anything sticking up or the canvas will cut. Putty the nail holes and plane off any high or rough spots and give the top a coat of paint. The canvas for covering the house may be bought in a single piece; when you get it, allow for turning it down all around and allow enough for a good grip on the ends. Now give the house top a coat of thick paint or marine glue and get the canvas on while it is fresh. You'll need help for this job. Tack it along the forward edge, being sure that you have it square, and then pull aft on it and also out to each side. Drive enough tacks to hold it, having them just below the edge of the house. Then tack along the after edge. You ought to get it on without any serious wrinkles though there will almost certainly be a few small ones. Now close tack it all around and tack it along the opening of the hatch. Have these latter tacks so that they will be under the coaming of the companionway when it is on. Now give it another coat of paint or glue. Trim off the excess canvas neatly with a sharp knife. The tacks used should be either galvanized or copper, not ordinary blue iron carpet tacks. You don't want to have rust streaks.

Now frame the coaming for the hatch, halving its ends together, and fit it in place. Trim off till it fits and then set in marine glue or a mixture of white lead and old thick varnish—what the painters call "slush". Fasten it well and then cut out the canvas over the hatch, turn it up and tack it. Canvas and joints are then to be covered with a mahogany facier. Make a good miter of the corners. Now put on the moulding around the top of the house and fasten it with plugs over the

(Continued on page 196)

Grass Coil With Spiral Trough Measures Golf Drive

GOLFERS can practice driving to their hearts' content, and win the additional satisfaction of knowing just how far the ball would have gone on an outdoor course if they use the target recently invented by an Englishman. It is shown at the right. The ball is driven through a funnel-like opening leading to coiled runways which hold it until it has lost its momentum. There are nine circuits arranged spirally, as shown in the photo. If the ball completes the nine circuits, it represents a drive of 300 yards. Strength of the drive is automatically indicated.



A golf ball entering this device runs around the coil until its force is spent, the distance covered is registered automatically.

Sugar Violin Plays Music

CONSTRUCTED entirely of sugar by Adolph Hubner, a San Francisco confectioner and sculptor, the novel violin shown above produces excellent music. The instrument was first modeled in cardboard, and finally modeled in sugar with gum tragacanth. A number of famous violinists have pronounced the instrument excellent in tone.

Sound Volume Told by Finger Tips

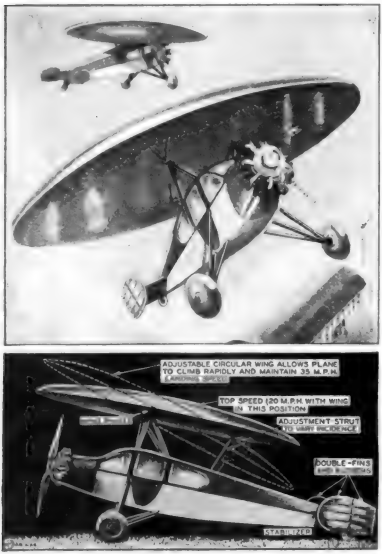
AN EAR is ten to sixty times better than the finger tip in recognizing the pitch of a musical tone, but no better at all in distinguishing the volume of a sound, according to Prof. Robert H. Gault, of Northwestern University. Many tests with deaf people, both children and adults, have proved that such people often can learn to determine the loudness of a sound as accurately as if they had perfect ears. This ability is due probably to a primitive vibration sense coming from the lower animals.

"Window" in Bag Shows Contents

VEGETABLES commonly sold in bags can be examined before purchase when packed in the "window" sack shown at the right, in which half of the bag is woven in an open pattern which permits the contents to be inspected. The idea was worked out by R. J. Cheatham, textile specialist of the Department of Agriculture, at Washington, in the course of his duties.

Contents of this "window" bag can easily be inspected by a prospective purchaser.

Circular Wing Airplane Has Variable Angle of Incidence



The upper drawing shows how the circular wing plane would appear in flight. Below are the structural details of the plane.

AN UNUSUAL monoplane, having a circular wing instead of the conventional airfoil, has recently been developed by S. M. Nemeth, of Chicago. This wing is pivoted in the front on two inverted "vee" struts as shown at the left, with a third strut for varying the angle of incidence in flight at the will of the pilot.

The disc wing is 23 feet in diameter, and the designer claims that this area is equivalent to the lifting surface of a 32-passenger Fokker which has a wing span of 100 feet.

With the wing adjusted for a high angle of incidence the plane climbs rapidly and develops a top speed of 120 miles an hour after the disc has been flattened out. The landing speed is said to be about 35 miles an hour. At the date of this writing the plane had not been test flown.

Plan Radio Burglar Alarm

A RADIO burglar alarm system is proposed in a western city on a wave length of 109 meters. It is planned to hook up wires in homes and business establishments to a radio system with a central office and special signals.

Only One Way to Visit Stars

FOUR methods of traveling through space outside the earth have been suggested, Dr. John Q. Stewart of Princeton University told a recent meeting of the Amateur Astronomer Association of New York City, but only one of these methods seems to have any chance of becoming a reality.

The one which seems to have a theoretical possibility in the present state of knowledge is the proposal of a car propelled on the principle of a sky rocket. Even this rocket method has the practical difficulty that there is not now known to science any fuel containing enough energy per pound for astronautic travel, although the development of such a fuel is not impossible.

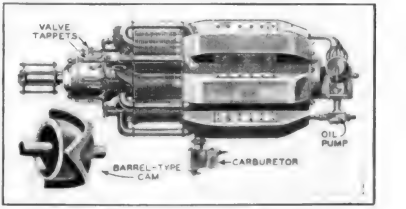
Cannot Be Opened From Outside

A STEEL guard, which prevents opening a door from the outside, is now obtainable. The device consists of two flat pieces held together by a short chain. One of the pieces slips into the lock socket while the other fits into a slot.

Door cannot be opened while this guard, which may be removed in a second, is in place.

Barrel Cam Engine Reveals a Number of Novel Features

F. ERNEST of Los Angeles has recently designed a barrel cam engine which introduces several features which have long been sought in the aviation industry. The most important of these is that the new cam permits the motor to turn over twice as fast as the propeller without the use of gears, allowing the advantages of a high speed engine with a propeller turning at its most efficient speed. With the cylinders lying in a horizontal plane, the frontal area is also greatly reduced, cutting down air resistance.



This seven-cylinder engine develops 250 horsepower with a weight of 375 pounds. Each cylinder completes a four-cycle operation on each revolution of the propeller shaft, allowing 10,500 explosions per minute at 1,500 r.p.m.

Gas Station Shaped Like Wigwam

Unique filling station, shaped like Indian wigwam, attracts considerable attention from motorists.

WHAT is one of the most unique filling stations in the United States is built in the shape of an Indian wigwam and is located near Lawrenceville, Kansas. Near it there are several other stands, also shaped like teepees, but smaller in size. Eventually the site will resemble an Indian village.

New Fire Paste Supplants Matches

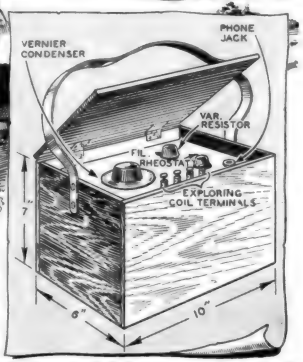
A GERMAN dye and chemical company has perfected a substitute for matches that looks like toothpaste, and comes prepared in the same manner. So long as the material remains inside the tube nothing happens. When the user wants a flame he simply squeezes out a drop of the substance, which catches fire as it falls, and ignites anything it comes in contact with. The tube of fire paste costs considerably less than matches, and is equally as safe.

Telephone Mike Shuts Out Noise

A NEW microphone unit which has recently been placed on the market enables speakers to carry on an intelligible conversation, no matter how much noise there may be. This new device, shown in the photo at the right, is so constructed that it shuts out all interfering noises, and at the same time amplifies the voice, so that it comes clear and distinct to the party at the other end.

The mike unit is attached to the phone as shown.

A Simple



Hunting buried treasure or other valuable hidden metals will prove an exceedingly fascinating pastime with this radio treasure finder, which is similar to those used by geologists in locating ore deposits.

The completed finder is mounted in a handy carrying case, as shown in the drawing above.

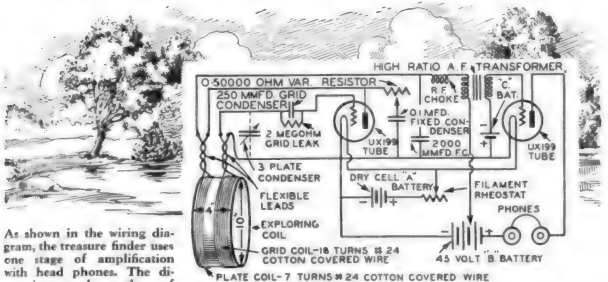
RADIO fans who have ever built a receiving set that was improperly shielded will remember the awful howl that sounded out in the phones when the hands were brought near the tuning dials. This was caused by what is known as body capacity. The hands, on coming near the apparatus, created a condenser effect among the various parts, and by doing this altered the various relations of inductance and capacity, so that the tube spilled over, so to speak, and started squealing like a stuck pig.

This same troublesome squealing, however, can be converted from a vice into a virtue in a receiving set. For metal when brought close to the set will have the same effect as the hands, and by utilizing this tendency we can make a radio receiving circuit indicate by pitch of the squeal when there is metal somewhere in the vicinity.

Before building a treasure finder, let us study the theory for a moment. Any oscillatory circuit depends upon a certain amount of coupling between the plate and grid circuits. Now if an oscillator is built so that the oscillations depend upon the coupling between two coils with a large electrical field, it will be very sensitive to anything that may enter the field and alter the coupling between the coils. Thus, if a receiving circuit is set to squealing, there will be a change of pitch in the squeal when the coils come near anything that affects their fields.

An excellent and highly efficient circuit which can be used to locate hidden metals is shown in the diagram at the top of the next page. The apparatus is mounted in a case as shown above, so that the treasure finder can be carried anywhere. The tubes, batteries, transformers, fixed condensers and gridleak and choke coil are mounted in the

Radio Treasure Finder



As shown in the wiring diagram, the treasure finder uses one stage of amplification with head phones. The dimensions and number of turns of the exploring coil are also given, but may be changed with experimentation. The 4½-volt "C" battery is optional. Tuning is done with the three-plate vernier condenser and variable resistance.

interior of this case, while the vernier tuning condenser, variable resistor, exploring coil binding posts and phone jack are mounted on a hard rubber or bakelite panel that fits in the top of the case, as illustrated.

The wiring diagram of the treasure finder is shown at the top of the page. Only one stage of amplification is used, but another can be added if convenient. Head phones are used instead of a loudspeaker, as the ear is more sensitive to changes in sound when these phones are clamped on tightly. The use of a loudspeaker is strongly advised against.

UX199 tubes will serve the purpose excellently here, but any other kind of tube will suffice; it is necessary that the tube used simply be a good oscillator. If you have difficulty in getting your tube to oscillate, remove the 2 megohm fixed gridleak and substitute a 5 ohm variable leak. The R. F. choke coil in the detector circuit consists of three inches of No. 30 double cotton covered wire on a ½-inch tube.

The exploring coil is one of the chief items of the set, and some experimentation may be necessary before the number of turns is found that is most efficient. For the best results in all kinds of work, however, the dimensions and number of turns specified in the wiring diagram will prove the best. The exploring coil can be wound on a cardboard cylinder, but if none is available, a wooden frame may be used. The flexible cords from the coils are hooked to the terminals on the panel of the kit, as shown.

After you have built the treasure finding kit and are ready to begin exploring, it is a good idea to listen in for a while and learn how to detect changes of sound due to extraneous capacity effects, as the whole success of your hunt depends upon the sensitiveness of your ears to noises that go on in the ear phones. Set the tube to squealing by adjusting the 3-plate vernier condenser and the variable resistance, then bring the exploring coil close to some mass of metal. You will notice that as the coil is moved closer the note or pitch of the squeal will go up or down.

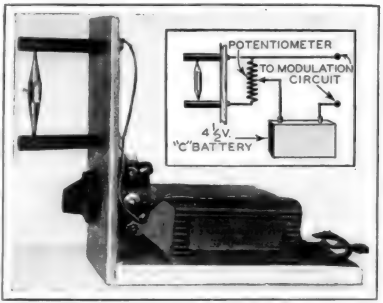
Another method of detecting the proximity of metal is to set the condenser at the point where the tube had just gone into oscillation. When the exploring coil is close to the metal body the oscillation will cease with a click. The choice between these two listening methods is merely a matter of preference of the experimenter.

It may take a little time to get the feel of the set so to speak, but when you do you will find the business of locating ore deposits, sunken engines, buried water or gas mains, etc., a fascinating pastime.

A Simple "MIKE" for Radio Fans

by **L. B. ROBBINS**

Edited by Mr. L. B. Robbins, nationally known radio expert and operator of amateur station W1AFQ, this department is devoted to presenting stunts and ideas that will be of great practical value to experimenters and radio fans who build their own apparatus. Simplicity and low cost of construction are the chief features of the plans offered.



The improvised microphone is mounted and wired up as shown above. Voice modulation is governed by the potentiometer.

THIS little stunt will furnish the radio experimenter with plenty of amusement if he is interested in using a microphone for transmitting speech by means of a radio sending set or over a broadcast receiver. The device works on a principle used years ago in telephony, and if properly constructed will actually transmit speech clearly.

First, make a little panel of cigarbox wood five or six inches high and arrange a potentiometer near the bottom, as shown in the accompanying photo. The panel should, of course, be mounted vertically on a wood base. Then above the potentiometer bolt the two old "B" battery cell carbons so they project out horizontally, one directly over the other, and about two inches apart. The threaded brass bolt can be thrust through a hole in the panel and held to it by a nut as shown.

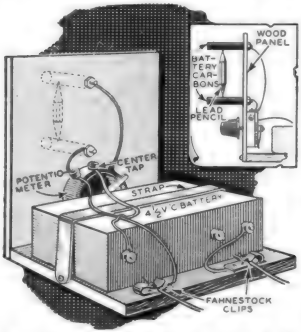
Now drill a small hole in each carbon so they face each other and then insert the sharpened points of a piece of lead pencil as indicated. The points should fit in the holes so there is just the slightest play between them and the carbons.

Arrange two Fahnestock clips at the back of the base and then strap a 4½-volt "C" battery to the base. Wire each carbon to opposite sides of the potentiometer, as illustrated in the accompanying wiring diagram. Wire the middle side of the potentiometer to one side of the battery. Then connect the other side of the battery to one of the clips and connect the remaining clip to one of the end terminals of the potentiometer.

Connect the clips to a head set or to the microphone circuit of transmitter or receiver. An excellent modulator circuit is given at the bottom of the following page.

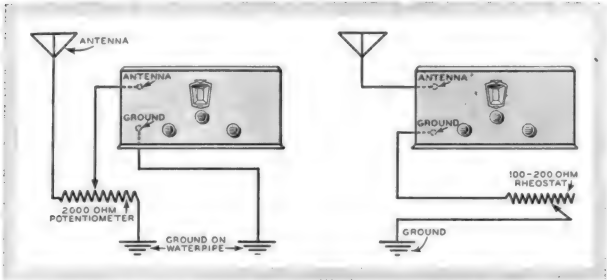
Speak about a foot away from the pencil, gradually bringing the mouth nearer until speech is heard. Then vary the battery input by means of the potentiometer until the modulation is the clearest.

Such a microphone is crude but will give plenty of chance for improvement and experimentation.



A rear view of the mike, showing wiring of the parts. The pencil fits loosely in the carbon holes.

Two Efficient Remote Control Hook-ups for Your Receiver



The potentiometer or rheostat is placed at the point from which the volume is to be controlled and the wires run to the receiver and hooked into the antenna or ground circuit, as shown in drawing.

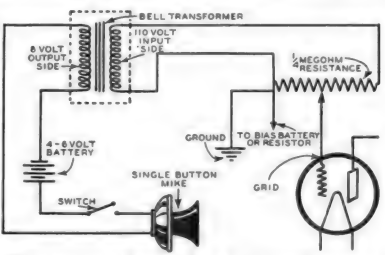
NOW-A-DAYS most all the best receiving sets are equipped with some means of attaching a volume control that can be operated from a distance. You can easily equip your old style receiver with a remote control arrangement by using one of the two simple stunts shown above.

One method is by by-passing the antenna current through a potentiometer. This passes more or less of the antenna current into the set, sending the balance to the ground. If possible, get a 2000 ohm potentiometer and attach the antenna lead to one side. Connect the middle terminal to the antenna post of the set and the remaining terminal to a separate ground connection. Thus by moving the knob the volume can be easily controlled.

The other method is to use a 2000 ohm rheostat directly in the ground lead. It works nicely where the antenna is not too long and makes the simpler method of the two. With a long antenna it may give best results by inserting in that circuit instead of in the ground. Either the potentiometer or rheostat, as the case may be, is placed at the desired point from which the receiver is to be controlled, and wires run to it from the set.

Bell Transformer Makes Modulation Transformer for Voice Transmission

AN ORDINARY bell ringing transformer will serve quite efficiently as an improvised modulation transformer, using the circuit shown in the accompanying drawing. The secondary, or 8-volt side, is run to the mike and battery, and the primary, or 110-volt side, is run to the outside terminals of a 0-250,000 ohm potentiometer, as shown. Modulation is controlled by the movable arm, which is connected to the modulator tube grid. If no potentiometer is available, use a ¼-megohm grid leak, grounding one side and attaching the grid to the opposite side.



When wired up as illustrated above, the bell transformer makes an efficient modulation transformer. Modulation is controlled by the movable arm of the potentiometer, wired as shown.

Outwitting the PLANT

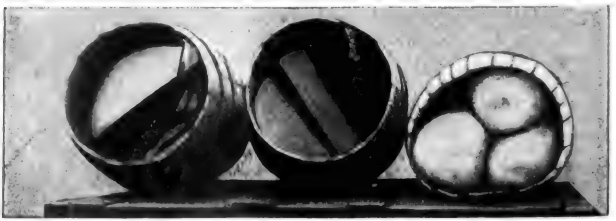
Top photo—Inspector examining truckload of Mexican vegetables for forbidden plants. Lower picture — Plants smuggled inside a magazine.

IT WAS an ordinary looking package in the hands of an honest-appearing man who stepped from the steamer Charlotte M. Hall onto the Baltimore dock not so long ago.

The parcel had passed the customs officials, and had, apparently, a clear road to its destination anywhere in the United States. Yet it contained destructive agents that bade fair to wreck hundreds of millions of dollars' worth of property, and that might have left a trail of poverty and ruined homes throughout a period of many years.

Fortunately the U. S. government has eyes, concealed in unexpected places. This package aroused the suspicion of an inspector of the Plant Quarantine and Control Administration of the U. S. Department of Agriculture. He got possession of it, questioned the owner, opened the parcel, and saved the nation from a loss than can scarcely be calculated.

The passenger who landed that day from the Charlotte M. Hall was a Mississippi planter, returning from a business trip to Brazil. He was a progressive farmer, and his motive—the improvement of his cotton crop—was legitimate enough. But the package contained 59 separate sets of cotton seed, every set infested with living larvae and adults of the dread pink bollworm, the most destructive enemy of cotton in the world. Already it has destroyed the cotton industry of the Hawaiian Islands, and annually inflicts tremendous damage upon the cotton planters of Egypt, Brazil, Mexico—in fact, every great cotton growing country in the world save the United States.



False barrel bottoms are a common ruse used by smugglers shipping contraband goods into the country.

SMUGGLERS

by James Nevin Miller

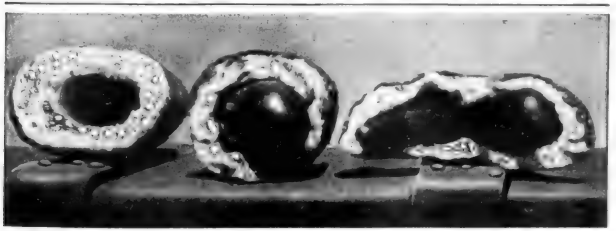
Experts say that if this innocent appearing personal package had not been intercepted through the vigilance of a plant inspector, it would have carried to the heart of Mississippi enough living pink bollworms to have started an invasion of the entire state which might easily have gotten beyond control before discovery.

This incident is only one of the many thousands involving similar interceptions made annually by the inspectors of the Plant Quarantine and Control Board. Their job is to prevent plant and fruit smuggling, innocently intended, or otherwise; and their personnel, while comparatively small numerically speaking, is of the highest caliber. Inspectors are stationed at all principal ports.

Down along the Mexican border the Federal officers have their share and more of adventures, humorous and dangerous. Even some of the old-timers hardly dare put their hands in their pockets while working in certain hard-boiled communities, for fear of being shot at from behind. The license tags of their trucks carry the letters, U. S. D. A., meaning of course, United States Department of Agriculture. But thirsty souls, and there are many along the border, are prone to take a different interpretation—United States Dry Agent! And lovers of the corn and rye like to take the law in their hands—when in doubt.

And now for some of the tricks of the smugglers! The following side-splitting incident took place at the port of New York a few years ago. It seems that a woman arrived from Jamaica, and in her possession was dis-

Top photo—Smugglers conceal plants in jackets like this worn beneath clothing. Lower picture—Inspector examining plants from foreign lands.



These contraband alligator pears were ingeniously concealed inside loaves of bread by Mexican smuggler.

Here's an attempt to smuggle avocadoes into the United States, listed as "canned fruit," which proved unsuccessful.

Along the Mexican border, this type of bag has been used extensively by smugglers trying to sneak contraband plants and fruit into the United States. The bags are worn under the clothing, usually concealed beneath voluminous skirts of the wearer. These particular bags contained 52 prohibited avocadoes which are likely to harbor dangerous insect pests. Stiff fines are the penalty of detection.

covered a basket containing some plants. They did not meet the current rigid requirements so a plant inspector explained that her plants could not be brought in. The good woman explained that she really wasn't greatly interested in the plants themselves, but that she was anxious to have the soil for her prize cat to play in—he did so love to frolic about in Jamaica soil.

A tear or so appeared in the official's eye—for he was a kindly soul. However, it did not remain there long. After being hard-hearted enough to do his duty and advise the dowager that she must return home sans the soil, he gave it the thorough Sherlock Holmes. Hardly had the good woman departed when his astonished, but no longer humanitarian eye, noted two bottles of Jamaica gin buried therein.

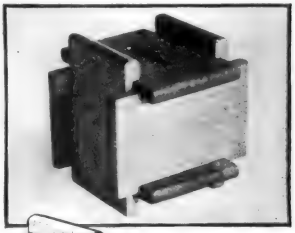
Joseph of Biblical fame had a coat of many colors. But the inspectors around Brownsville, Texas, and the notorious Tia Juana district, are still chuckling over the Mexican of many pockets. Some years ago this man came waddling across the border at such a slow rate that he aroused suspicion. To begin with, he was plump, but his avoirdupois seemed to be not altogether of the flesh. And it was not, as examination of his portly person revealed. Inside his coat was an ingeniously devised vest containing many pockets

(Continued on page 194)

Combination Toy Bank and Block Puzzle

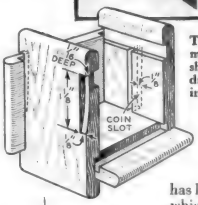
by **A. NEELY HALL**

In the pages of this Home Workbench department, you will find plans for the construction of devices that are serviceable and easy to build. Mr. A. Neely Hall, editor of this department, is the author of "Carpentry and Mechanics," "Big Book of Boys' Hobbies," and other well-known works on craftsmanship.

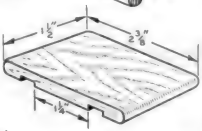


The assembled toy bank, made up of the six pieces shown in the accompanying drawing. Coins are inserted in the slot in the top piece.

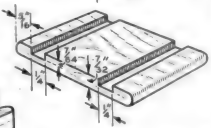
HERE'S a novel little device, a combination block puzzle and toy bank, that will benefit the kids in two ways—it will teach them thrift and teach them to use their wits, for it takes wits to take the bank apart and put it together again. With a few exceptions, the parts are all of one pattern and can thus be turned out en masse. A mitre box, saw and chisel are the only tools you will need.



Use hard wood for the blocks. First, cut a strip of the correct thickness and width, and long enough for the six blocks. Then mark off the lengths carefully, and locate the grooves. Finally separate the pieces and cut the grooves.

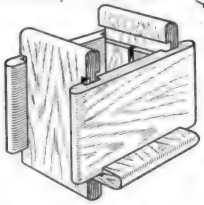


Great accuracy in cutting is necessary in order that the parts may fit together neither too snugly nor too loosely. A clearance of 1/32-inch has been allowed in all joints, which is ample.



When you have cut the grooves, clean them up with sandpaper. Next, cut the coin slot in one block and notch the back edges of another block as shown in the accompanying drawing. Notice that the edge notches are 1/8 inch wide, and that they taper in depth from 1/16-inch at one end to nothing at the other.

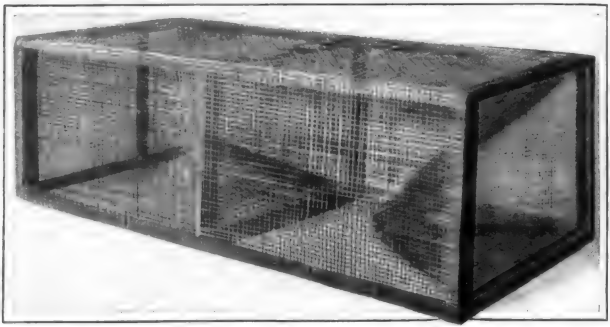
When the grooves, coin slot and notches have been cut, round off the ends of each block with a wood rasp or block plane. Then rub down all surfaces with No. 00 sandpaper, and finish with shellac, wax or lacquer.



The above drawing shows the individual pieces and the method of assembling them to form the completed bank. All pieces of the same dimensions, cut from 7/32 inch white pine stock.

The accompanying drawings explain the assembly of the bank. Using one block for the base, set up three other blocks, including the notched block, as shown. Then add a fifth block and finally slip the sixth block into place. The notched block will spread just enough to admit the sixth block. You may find that 1/16 inch is deeper than necessary for the notches of the block, due to slight deviation from diagrams. It might be well to assemble the blocks before cutting the notches for the purpose of checking, as the success of the device depends a lot on the snugness of the fit.

A Garden Sparrow TRAP



The completed sparrow trap. Birds are lured into the cages by grain sprinkled at the entrances.

WHEN English sparrows become so numerous in a neighborhood that they are a pest, and when they take possession of houses put up for song birds, then there are sufficient grounds for destroying them. But, in starting a campaign against them, it is important that one shall be able to distinguish them from other members of the sparrow family, of which there are about eighty species. Otherwise, more harm than good may result from the drive, because most of the other varieties are desirable birds to have around.

Assuming that you are a trained observer of birds, and can single out the English sparrow from his better mannered relatives, trapping is suggested as the best means of getting rid of him, because it is possible to examine the catch and to release all other species. The objection to shooting is that the markings of sparrows are not readily discernible at a distance.

The photograph above shows a sparrow trap similar in construction to a model tested out and approved by a station of the United States Department of Agriculture. In two years that this model has been used, 355 sparrows were captured one season, and 305 the next, which is proof of its effectiveness.

As you will see by the photograph and the accompanying drawings, the sparrow trap consists of two compartments, each of which has a funnel-shaped entrance. It is baited with grain, sprinkled on the ground at the front entrance and inside of the com-

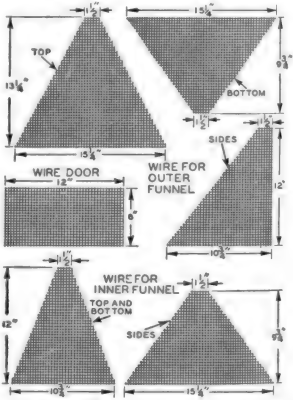


Fig. 1. Wires for the inner and outer entrance funnels and the door are cut to pattern shown.

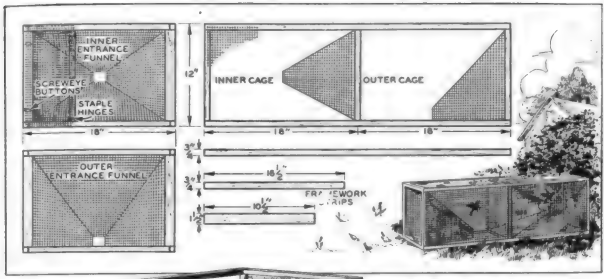


Fig. 3. Dimensions for the trap are given in the above drawing. Trapped birds are removed through a rear door.

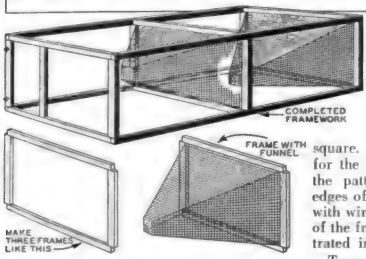


Fig. 2. The framework for the trap is constructed as shown above. The two entrance funnels are fastened to the center and end frames with staples.

partments. Sparrows, naturally of a curious nature, find the entrance through the outer funnel into the first compartment; then, led on by the grain, they discover the entrance to the inner funnel and hop through it into the inner compartment.

When within the inner compartment, they do not seek an exit in the direction they came from, but through the sides, rear and top of the trap, where they see the most light. A doorway for removing trapped birds is provided in the rear end.

Figure 3 of the drawings shows the front, rear and side of the trap, while Fig. 2 shows the frame work. This frame work requires three sizes of strips, which are shown in Fig. 3. Rip them out of ¾-inch stock. Build three frames like that shown in Fig. 2 out of the two shorter lengths of strips. Notice that the strips are lapped so as to leave corner notches for the side strips to fit in.

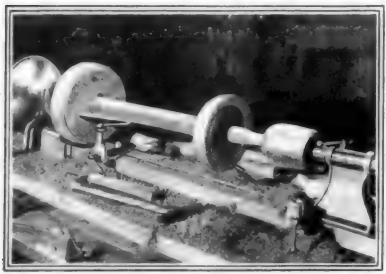
When you have finished building the three frames, shape the wire entrance funnels to fit in two of them. Make these of galvanized wire cloth, with mesh ¼-inch square. Cut the top, bottom and side pieces for the outer and inner entrance funnel by the patterns given in Fig. 1. Bring the edges of the pieces together and fasten them with wire. Then fit the funnels inside of two of the frames, and fasten with tacks, as illustrated in Fig. 2.

To complete the trap frame work, join the three frames with the four horizontal strips, placing the inner entrance funnel frame in the center, and the outer entrance funnel at one end.

Paint all parts of the framework with two coats of paint, before covering it with wire. Buy galvanized wire cloth with ¼-inch mesh for the sides, rear end, top and half of the bottom of the trap, and netting staples for fastening it on. Put on the top and side covering in one piece, and cover the bottom of the inner compartment with another piece. The bottom of the front compartment should not be enclosed. Set a vertical strip in the rear frame, about eight inches from one side to form a doorway. Enclose all of this frame but the doorway, and hinge a strip of wire cloth with staple hinges for a door. Use a pair of screweyes for door buttons. Slot the wire for the eyes to slip through, and give the pair a quarter turn, the same as buttons, to lock the door.

When you have completed the construction of the trap, paint it green and set it at any point in the garden.

Turn Out This CIGARETTE



The various pieces are first glued together and then turned out on the lathe, as shown above.

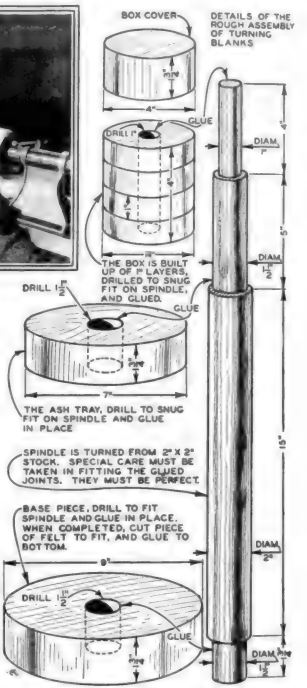
by DALE VAN HORN

Here's a handy and easily-made cigarette stand and tray that will make an attractive piece of furniture for your den.

IF YOU have access to a good lathe, and know how to handle a chisel, you can easily turn out this excellent cigarette stand in a short time. All the material you will need for the job is three pieces from 1¾-inch stock, four pieces from 1-inch stock and a piece 2″x2″ x 2′ 2″ for the upright, all of walnut.

These pieces are first cut down to the dimensions shown in the drawing at the right. It might be a good idea to turn out the tray, box, cover and stand on the lathe first, and then fit them on the spindle, but to secure a perfect balance and centering of all pieces, as well as a fine blending of one piece with another, the best method is fit all parts on a spindle and turn them out in one piece.

First put the upright, or spindle, between the lathe centers and turn it down to the dimensions shown in the drawing at the right. Then cut out the circular piece for the tray, making it seven inches in diameter, and bore a 1½-inch hole exactly through the center. Next cut out the piece for the base, which is nine inches in diameter, with a 1½-inch hole

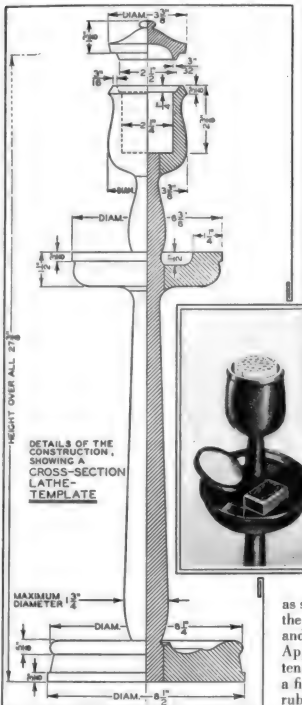


The above drawing shows dimensions and method of assembly of the pieces used in construction.

through the center. To make the holder glue up the four one-inch walnut pieces in a press, and when dry bore a well centered one-inch hole through the 4-inch block.

The next task is to glue these three pieces in place on the upright. It is essential here to see that they all fit down tightly in their places on the upright. Apply the best quality

STAND on YOUR LATHE



The walnut pieces, when glued together, are turned down on a lathe to the dimensions shown here. The box lid is turned separately.

liquid glue to the tenon and hole of the base section and tap the upright home. Then do the same with the tray piece. Finally glue on box block, and let the assembly stand a while for the glue to dry.

The completed cigarette stand makes a handy and attractive article for your den. The photo at left shows tray and holder.

Next reseat the spindle to make ready for the actual cutting. Caliper measurements are given in the accompanying drawing. Be sure of a firm rest and have your cut-off chisel sharp. When the stand has been cut down as shown in the accompanying photos, sandpaper the piece till all chisel marks have been removed, and finally finish off with a very fine steel wool. Apply a good walnut stain, allowing it to soak ten minutes before wiping it off with a rag. As a finish apply several thin coats of clear lacquer, rubbing the piece between coats with a cloth. The final polish is put on with fine steel wool and a clean rag.

This completed, you can now cut the box depth and cut off the center piece in the usual manner. All that remains now is the turning of the top. Put the piece on the face plate with the screws near the edge and turn the underside of the top first. Then reverse and turn the top with a small center screw face plate. Finish the job in the usual manner.

New German Pistol Takes Sting Out of "Stick 'Em Up!"

A GERMAN engineer named Edmund Weber has invented a pistol which can be discharged while the hands are raised. The weapon is enclosed in a leather holder strapped around the body.

By means of springs the pistol can be controlled by the raising of the arms. If they are only slightly raised, though to the satisfaction of the bandit about to commit robbery, the gun does not go off. But just as soon as the owner stretches his arms fully upwards, he is able to release a spring which pulls the trigger.

A little opening is fitted in the corner of the holder out of which passes the bullet after aim has been slyly taken.

Target practice with the new pistol has demonstrated that considerable accuracy may be attained quickly.

The pistol cannot be fired in this position. The arms must be fully extended, as shown in above photograph.

Improvised Heat

A FORD radiator and gas tank, water heater and small electric fan, make up a simple unit heater for isolated store or shop. Gasoline supplied by the tank burns in a heater and heats the water, which circulates up to and through the radiator. Air blown through the radiator is heated and circulated around the room.

Natural Gas Hook-up for Nation

A NATURAL gas system inter-connecting all gas lines in the United States was visualized as a possibility by George I. Rhodes and Edgar G. Hill, eminent engineers.

It was also suggested that some means be discovered of liquefying the gas cheaply and running it through the pipe lines in that form, and turning it back into gas at the market, thus saving half the cost of transportation. Liquid gas contains the same amount of energy as twice its bulk in vaporized gas.

Building Has Odd Outlook on Life

THIS curved row of balconies is to be seen at a new block of dwellings near Berlin, Germany. The whole block is built in this type of architecture.

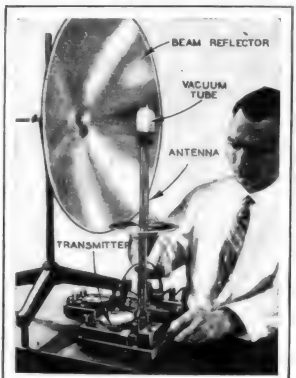
The curved balconies as seen from the street.

Lady's Pencil Holds Lipstick in End, Handy for Make-up

THE latest addition to milady's equipment for keeping herself attractive to the opposite sex at all times is a combination pencil and lipstick, which enables her to keep the natural crimson of her lips even while inditing a letter. No larger than the ordinary automatic pencil, the device can easily be carried in her handbag. The lipstick is contained in a tube at one end of the contraption, while the pencil occupies the other, as shown in the photo at the right. When in use the stick is run out into position by means of a small slider, and the pencil is adjusted by turning the cap which contains the coloring matter.

With the new combination pencil and lipstick shown above, the user can keep her lips well decorated even while writing a letter. When not in use the lipstick is concealed in the pencil barrel.

New Short Wave Beam Transmitter



Reflector directs waves of this short wave radio.

THE most recent developments on the field of ultra-short-wave radio is represented in the new beam transmitter displayed recently at a German radio exhibition. Mounted in the rear of the tube is a concave reflector that serves to concentrate the waves in one direction. The tube leads act as the short wave aerial.

Radio Needle Removes Moles

MOLES and other unsightly blemishes which mar the skin of an otherwise attractive face are now being removed by means of a radio needle recently devised by electrical engineers. The needle, shown in operation in the photo below, does its task painlessly and leaves no scar on the fair skin.

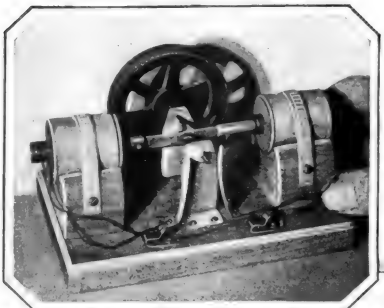
The device, which is now being widely used by beauty experts, consists essentially of high speed needle mounted in the end of a tube which is connected to the operating motor by means of a long cord. This arrangement permits the operator to work in any position. The needle is controlled from the panel on which are mounted the rheostat, indicator and other control devices. The entire outfit can be carried in a suitcase.

Controlled from the portable panel, the radio needle removes moles and other skin blemishes painlessly, without leaving a scar. Power is delivered through the flexible cord.

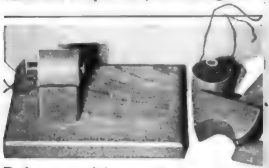
A Simple

by **Sewell V. Lehman**

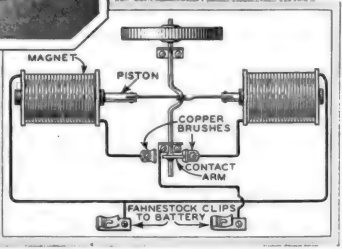
The Amateur Electrician Department offers this month plans for building an electric motor of extremely unique design. Powered by two solenoid magnets, it will easily operate small mechanical toys.



Here's the completed toy electric engine.



Each magnet of the motor is mounted in a wooden support, which is then glued to the baseboard as shown in the photo. The core ends are 2¼" apart.



This wiring diagram shows the hook-up of the motor. The contact arm touches the brushes as it revolves on the shaft.

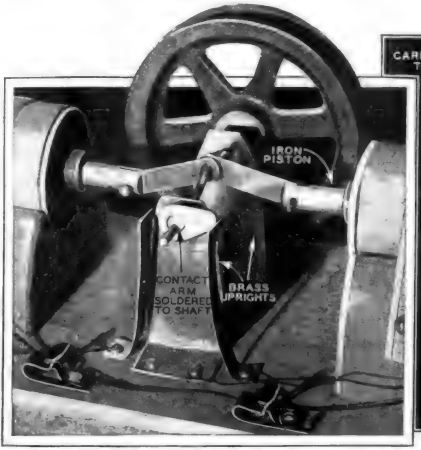
FROM a few odds and ends and a quantity of magnet wire you can construct an interesting little two-cylinder electric engine that resembles a steam engine in its actions. Electrical energy is transformed into mechanical motion by two solenoid magnets acting on iron pistons connected to a suitable crank shaft.

First, obtain two pieces of copper, brass or aluminum tubing about one and one fourth inches long and one fourth to three eighths inside diameter. Cardboard tubing can be used as specified in the accompanying photo, but metal is more satisfactory. Make a spool by slipping fiber or cardboard washers 1¼ inch in diameter over the ends of the tubing, and wrapping a few turns of adhesive tape around the center portion. It is best to glue washers to the tape, as this gives rigidity to the magnet. Then wind each spool with No. 22 cotton covered copper magnet wire, filling the spool space almost completely. This will produce a solenoid that will operate from a storage battery or bell transformer. The right hand photo on the opposite page shows the quickest and most efficient method of winding these magnets.

For the pistons cut two pieces of soft iron rod about 1¼ in. long and of a diameter that permits them to slide freely inside the magnet cores. Saw a slot in one end of each piston, drill a hole through the sides at right angle to the slot, and insert and rivet the connecting rods. These are flat pieces of metal about one inch long and ¼ inch wide. The other end of each "rod" is drilled so that it will pass over the shaft as shown in accompanying photos.

Mount the coils on wood supports as illustrated above, with the inside ends of the cores about two and three-fourths in. apart. Fasten the supporting blocks to a wood base measuring about 3¾x5¾ in. Make the shaft from a length of fairly heavy wire. A No.

Two-cylinder Electric Engine



The various parts of the motor are mounted as shown. The pistons are attached to the crank throw by means of two metal strips, and the contact arm is set so that it touches the brush when the throw is up.

The magnet wire is wound over a metal or cardboard tube, with fibre washers placed on the end as shown in this photo.

10 copper wire will do, as it is easily handled. Then bend, near the center, a crank with a throw of about 3/16 in.

Bearings consist of holes drilled in the two flat strips of copper or brass which serve as the uprights. The lower ends of these uprights are bent at right angles so that the shaft is on a line with the magnet centers. Insert the crankshaft, slipping the connecting rods over it until they rest in the kink or crank, and then attach the flywheel. This can be almost any kind of a wheel, such as the pulley wheel. It should be about 2¼ in. in diameter. A convenient way of fastening it on is to drive a wood plug into the wheel hole, drill a small hole in the plug to receive the shaft, and force the wheel into place. You can flatten the shaft a little to prevent slipping.

On the opposite end of the shaft mount, with solder, a nut or washer to act as a spacer, and over this place a lug that projects out one fourth inch or so, as shown in the above photo. The position of this lug is important. When the crank is at its highest point, the lug should project to the right if the engine is to run clockwise, when viewed from the brush end of the shaft. If it is to run the other way, point the lug to the left. The two brushes are merely strips of spring brass, copper, or phosphor bronze mounted on the wood base, and not touching any other metal part. In wiring up the motor connect one wire from each magnet to one of the power wires, and each of the other magnet leads to one of the brushes. The remaining power wire goes to the upright that supports the crankshaft at the brush end. Do not oil the bearing in this upright, as this will tend to cause sparking and faulty contact.

This engine design can be modified to include any number of cylinders.

Carpenter Prints Largest Bible on a Home-Built Press

Using this home-built printing press, Louis Waynai, Los Angeles carpenter, printed his 8048-page world's largest bible in two years' time.

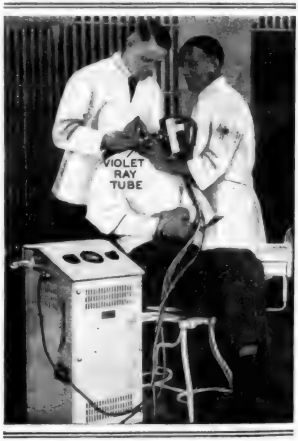
AFTER two years of constant labor, Louis Waynai, a Los Angeles carpenter, has at last completed the printing and binding of a bible that takes the honor of being the largest in the world. Using the hand stamping machine shown in the photo at the left, which he also constructed himself, Waynai printed onto the three-foot pages of his book every individual letter, symbol and punctuation mark in the Bible.

Weighing 1084 pounds, this "biggest Bible," has 8048 pages, which are bound with metal.

Ultra-Violet Rays Now Cure Pyorrhea and Improve Condition of Teeth

IN ORDER to cure that dread tooth disease, pyorrhea, and to improve the general health of the gums, dentists are now utilizing ultra-violet rays. In the initial tests carried out on prisoners at the Massachusetts state penitentiary, fifty-eight out of sixty cases were cured completely.

The ultra-violet ray is projected from the end of a thin quartz tube mounted on a high tension sparking device, as shown in the photo at the right.



In curing pyorrhea, the ultra-violet rays are projected from the end of a thin quartz tube mounted on the sparking device, as shown above. The flexible cord enables the dentist to move around.

Handy Utility Bag for Travelers

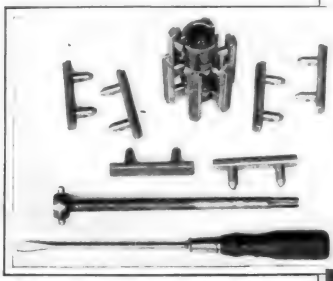
This collapsible utility bag folds up into small space.

A HANDY little collapsible utility bag for traveling or shopping has recently been placed on the market by manufacturers. Made of strong but flexible fabric it is closed by a sliding fastener and can be folded up and placed away in the pocket as illustrated in the photo at the left.

Reconditioning the Cylinder Bores

by RAY F. KUNS

Each month Mr. Kuns, a recognized authority in automotive matters, brings you new tips on the maintenance of your automobile and motorcycle. His article on the following page will interest those who contemplate building the "Gannet."



Here is a modern hone with an extra set of stones and the only tool necessary for assembling. A heavy duty, slow speed, half-inch or five-eighths drill is best for this work.

How an electric drill and hone are used for cylinder refinishing. Part of the weight should be taken up by a coil spring as shown in the photo.

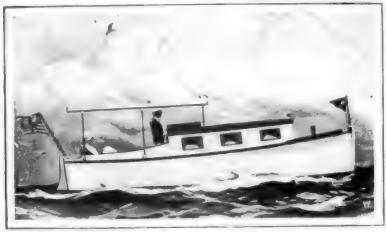
CYLINDERS ordinarily wear out-of-round and tapered. There is less wear at the bottom of the cylinder than at the top. There is less wear of the sides of the cylinder, fore and aft, than there is left and right. The first condition is due to the fact that the ring travel is confined more to the top of the cylinder bore. The second condition is due to the fact that side thrust of the connecting rod is a source of wear.

Originally the repair man resorted to the lapping process whenever he desired to recondition the cylinder. This process is just as good as it ever was. It is not largely used by garage men for the simple reason that new equipment, such as hones and portable boring, reaming and grinding equipment is available.

Perhaps the most popular method of reconditioning cylinders is the use of an electric drill in connection with a hone. In order to relieve the workman of some of the weight of the drill, a coil spring is used. The action of the hone is rotating as well as reciprocating, so that it should be visualized as a figure eight motion. The best speed for the drill is something under 300 r.p.m. and approximately fifty reciprocations a minute.

Most of the up-to-date methods of reconditioning cylinders are such that require the use of equipment to be found in automobile repair shops. The automobile owner, however, is interested in knowing just when his car is in need of this type of work. No definite rules can be laid down for so many miles of service before having cylinders reconditioned. Cylinders may give anywhere from 1,000 up to 100,000 miles before requiring reconditioning. Within recent years, it has been the growing practice to make use of the hone to recondition cylinders, without allowing them to become badly out of condition.

An Automobile Engine for a Heavy Duty Motorboat



This is the type of motorboat which can use a converted engine to advantage. An article on building this type of boat appears on page 135 of this issue. This is a twenty-one-footer.

IN RECENT years there has been a marked tendency on the part of marine engine builders to modify successful and proven automobile engines for use in boats. This is a tribute to the fact that automobile passenger car engines are much better than they were formerly. They are designed with better oiling systems, far better metal, better balance, sturdier parts, longer life and all of those features which make for satisfaction when placed under heavy load for hours at a time.

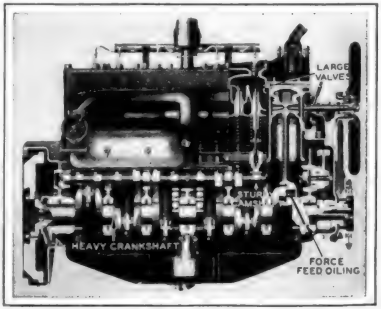
Herein is the prime difference between engine service on a boat and in a car. In the car they are seldom asked to serve at top power output for more than a few minutes at a time. On the water they are under full load at all times.

When rebuilding an automobile engine for marine service the clearances allowed are about the same as for passenger car use. Rebuild the job carefully, fitting pistons, rings, bearings, gears and other parts with utmost care.

Cast iron pistons are perhaps preferable to light weight pistons unless the job is designed to operate at speeds approximating full power output. If it is proposed to maintain speeds of 2500 r.p.m. or more, then light weight pistons would likely be used.

When fitting the engine to the boat it is always advisable to set it on somewhat of an angle in order to have the crankshaft more nearly in alignment with the propeller shaft. Ordinarily it is safe to raise the front end quite a bit and the engine may be set on an angle of five or more degrees. If the engine is splash type be very certain that too much angle is not secured, otherwise the troughs of the upper level in the oil pan may run dry and bearings be burned out.

A short propeller shaft is ordinarily fitted between the flywheel and the gear box. The ordinary transmission is done away with, a reverse gear set being interposed between the flywheel and the forward end of the propeller shaft. The centrifugal pump ordinarily supplied with the auto engine will not lift water from the bottom of the boat and so must be discarded in favor of a gear type water pump, which may be driven directly from the accessory shaft, or mounted lower down in the boat and driven by means of a belt from the fan pulley. In order to secure fair distribution of the water a number of outlets, small in diameter, are provided in the cylinder head; one near each cylinder. These may be manifolded into a single pipe, which in turn is run to the side of the engine and introduced into the exhaust manifold, or into the exhaust line.



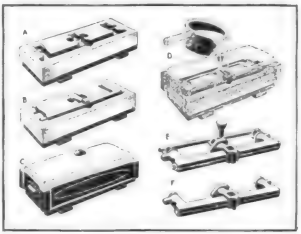
This phantom view shows features of good design with reference to automobile engines which may be converted to heavy duty motorboat use. The indicated points are important.

How Those Intricate Automobile Castings Are Made

THE progressive steps in making a casting of a manifold are shown in the accompanying illustration. At A the mold is shown containing the impression of the outside shape of the casting (formed in the sand of the pattern) together with the "canals" for conducting the flow of the metal. Molds are usually made in two parts with a parting line at the middle of the casting.

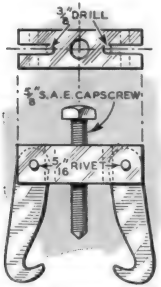
The core, shown at B, is the form for the hollow portion of the casting. It is made from finely selected sand, mixed with an oil compound and baked in an oven to brick-like hardness. After it has been placed in position the two halves of the mold are then clamped together, as shown at C.

The molten iron is poured in as shown at D. It flows into all of the openings left within the mold and surrounding the core. When the iron has cooled, the casting, E, is removed. The core on the inside breaks up into small parts and falls out with a little jarring. The view at F shows the same casting with the "risers" and scrap metal knocked off, ready for finishing.



The various stages in casting an automobile manifold. The core remains in the mold and the molten metal runs around it, as shown at D.

An Efficient Sprocket Puller



This is the puller which is made from a piece of 1¼ square steel, 2 hooks, and a ⅝ in. S.A.E. capscrew.

THE engine sprocket is very difficult to remove without injuring the shaft. To overcome this, a heavy puller, as shown in the sketch, may be made.

Two hooks, ⅜ x1x4 inches are made to fit the slots. The capscrew is 4 inches long and its end is ground to a 60 degree angle and case-hardened.

By placing the hooks over the sprocket and screwing the capscrew into the center hole of the shaft, great pressure is exerted. If very tight, a blow directed on the head of the screw will surely remove the sprocket.

Care of Spring Shackle Bolts

WHEN tightening spring shackle bolts, the first thing to do is to remove the cotter key. Then take two end wrenches, as shown in sketch A, and while holding the head of the bolt, turn the nut until all play is removed. When the nut will not turn any further, back it off about one-half turn to prevent undue strain on the assembly. Then make sure that all cotter keys are replaced.

After a time it will be found that the oil is not being fed through the shackle bolts as readily as originally, making it necessary to remove the wicking from the shackle bolt, have it washed out in gasoline, soaked in oil and replaced. The shackle bolt should be cleaned before replacing wick.

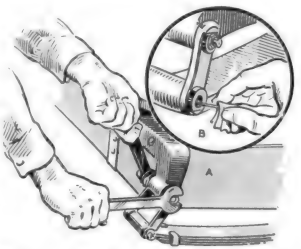


Figure A shows the method of tightening the spring shackle bolts. Figure B shows how the bolt should be cleaned before replacing the wick.

Hints on the Care and Adjustment of Motorcycle Chains

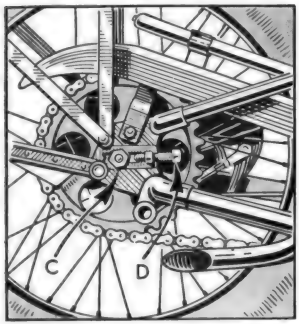
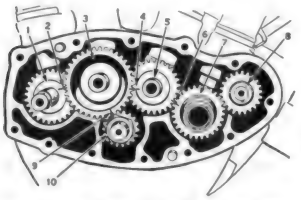


Figure 1. The two chain adjustments at the rear wheel, which are fully described in the text.

Timing Valves on a Harley Twin

IN THE Harley Twin 45 the gears are assembled in the case, as illustrated, with one of the marks on the rear inlet cam gear 3 in alignment with the mark on the pinion gear 10. Another mark is in alignment with the mark on the rear axle cam gear 1, at point 2 and the third mark, on gear 3, is in alignment with one of the marks on the front inlet cam gear 5, at point 4. Align the mark on the front axle cam gear 7 with the remaining mark on gear 5, as shown at point 6. With gears in this position valves are properly timed.

The generator gear, designated as 8, is not marked and may be inserted at any position.



Before replacing the cover, be sure fibre washers are in place over shafts of gears 3, 5, and 1.

CHAINS that are too loose, full of grit, dirt, or which lack lubrication, will cause unnecessary noise, jerking and rapid wear of chain and sprockets.

About every 1,000 miles, disconnect and remove the chain. Place it in a pan containing kerosene, shake it around to help loosen the dirt. Wipe it dry and dip the chain in a mixture of motorcycle engine oil and graphite. Wipe off the excess oil and put the chain on the sprockets. The split or open end of the spring clip of the detachable chain link must point in the opposite direction of the chain travel. If the chain is merely dry and not dirty, use an oil can, turn the wheel and feed oil to the inside of the chain.

To determine the proper tension of the chain, lift it at the bottom between the sprockets. It should only lift about one-half inch at this point. Most chains have loose and tight places in them.

If your motorcycle has two chains, always adjust the front chain first. Loosen the transmission and move it with the adjusting screw

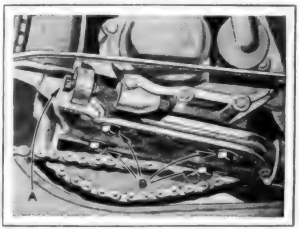
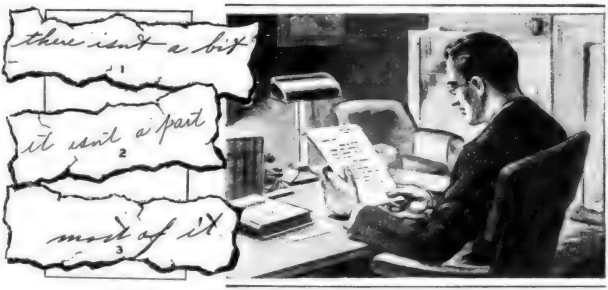


Figure 2. Chain adjustments at the transmission. A indicates the adjusting screw while B points to the four clamping nuts.

A, Fig. 2. Feel the chain and clamp the transmission at the proper point with screws (B, Fig. 2).

To adjust the rear chain, loosen the rear axle nuts C, Fig. 1 and draw the wheel backward until the chain has the proper tension. Revolve the wheel and note that the chain runs true on its sprockets and that there are no tight spots. The chain is aligned and the wheel held squarely in the frame, by the adjusting screws D, Fig. 1, on each side of the rear frame lug.

Your Handwriting Analyzed Free



M. N. Bunker, famous grapho-analyst, can determine the chief traits of your character from a specimen of your handwriting. In the specimens above, No. 1 reveals that the writer performs his duties thoroughly. The writer of No. 2 tends to shirk responsibilities, while No. 3 shows decision, firmness.

M. N. BUNKER, world famous grapho-analyst, has found, in analyzing specimens of handwriting to determine traits of character, that a man who "ties" the last "t" in writing a word, as does the writer in No. 1, is a person who does everything he undertakes to do, down to the finish. If he is a carpenter, he will complete the job down to the driving of the last nail, will pick up every tool, and then consider his work finished once and forever. If he is a business man he will leave no loose ends about his work. He does not allow work to accumulate and pile up, but does it, even though it requires long hours of tedious work. There is something in such a writer's nature that compels him to finish his tasks, regardless of the difficulties involved.

This is proved by a science that has come down to us through thousands of years—a science that dates back to the days when men drew pictures on cave walls with stones and sticks.

For hundreds of years this science developed until finally it was put into book form and called Graphology. Slowly it found its way into the medical colleges of Europe. Scientists like Havelock Ellis devoted time and thought to its development, until today, both in Europe and America, it is recognized as the science that reveals the truth about a man's character and ability from his handwriting.

Hence the fact that the writer of No. 1 is a man who finishes his task.

On the other hand, the writer of No. 2 is a person who is very unlikely to do things promptly. He puts off until tomorrow what he should do today; he leaves work undone, not because he is lazy but because he has formed a habit of side-tracking duties, no matter how pressing.

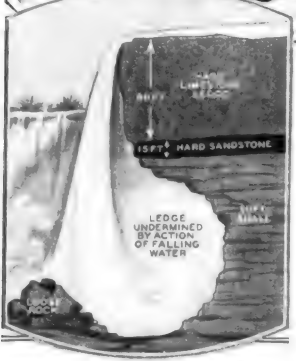
Your writer who crosses his "t's" as does No. 3 is a man who uses words that have an edge to them. He brings his cross-strokes down like arrow heads that cut their way through.

If he puts his arrow-like crossings back of the t-stem as does No. 2 you have a writer who puts off doing things just as long as he can. Finally, when he is compelled to do them, he is mean and sarcastic, driving his associates or subordinates fiercely. Such writers may be generous, but they are rarely successful in executive positions. They lack the precision, decisiveness and strength that make great leaders in any field of action. The writer of No. 3, however, has these qualities. His mind works with precision, firmness and clarity—characters necessary for leadership.

Your latent powers and talents, as revealed by your handwriting, will be analyzed for you free if you will send a stamped, self-addressed envelope, together with a specimen of your handwriting, to M. N. Bunker, care of Modern Mechanics and Inventions, 529 So. 7th St., Minneapolis, Minn.

Huge Slide HASTENS

A view of the American falls taken the day after the break. The huge mass of rock in the foreground fell in the great crash. The dotted lines indicate the original position of the rock mass.



Why the falls retain their beauty in spite of the continuous erosion is illustrated above. The hard limestone ledge breaks off vertically when the softer shales beneath have been worn by the water.

NATURE, tired of her eternal nibbling at the crest of the mighty Niagara, recently went on a rampage and took out a huge bite from the rim of the famous cataract. When this huge chunk of dolomite, estimated to be 130 feet long and 40 feet deep, crashed into the gorge below the American Falls, geologists once more reached for their pencils and paper and hurriedly checked up the time which remains for honeymooners to view one of America's major scenic attractions.

All waterfalls are short-lived as the geologists measure time, and by striking an average of the various estimates of these scientists and computing the present rate of erosion, we find that Niagara has reached middle age, and that it will be only a trifling matter of 20,000 years before the falls will eventu-

Ultimate Death of Niagara

The crest of the American Falls taken from Goat Island the morning after the giant break occurred. The dotted line shows the position of the crest the day before the huge wedge of rock broke away.

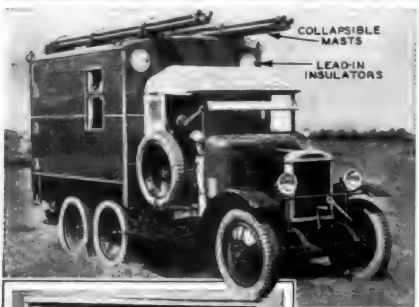
This bird's-eye view of the falls shows how nature has been nibbling away throughout the years, and how she performed several years' work in just a few moments on the American side.

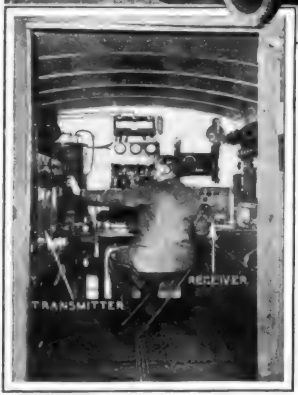
ally eliminate itself — unless the saving hand of man comes to the rescue.

Between 10,000 and 50,000 years ago, the Niagara River first spilled over the dolomite ledge at Lewiston, and since that time not one second has been lost in digging, undermining and dissolving at the solid rock, until now the falls has eaten its way back seven miles to its present site.

That Niagara maintains its beauty during the continuous process of erosion is due to the ideal underlying rock structure. From the escarpment at Lewiston for several miles to the south, the surface of the land is immediately underlain with a hard stratum of rock known as Lockport dolomite. Under this are various softer layers of sandstone and shale, which are undermined by the force of the water plunging over the precipice. This sapping of the support of the dolomite causes it to break off of its own weight and plunge into the gorge below. This is exactly what caused the latest slide.

Egyptian King Talks From Desert With Mobile Radio





Interior view of the radio truck shows powerful long-distance, short wave transmitter and receiver.

Radio station used by King Faud of Egypt while traveling in the desert.

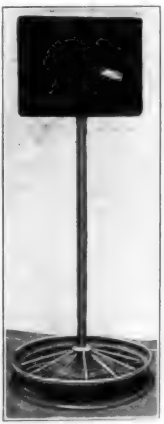
WHEN King Faud, traveling in his royal motor caravan, visits his subjects in the little isolated towns scattered throughout the great Libyan desert, he will not lose contact with the world, but will be at all times in direct communication with his capital, Cairo, through the medium of short-wave radio carried on specially equipped trucks. These mobile wireless stations, one of which is shown at the left, are mounted on six-wheel chassis specially designed for desert travel, and carry a special collapsible mast on the roof. The receiver and transmitter are carried in the interior, as shown in the photo.

Unthawed Meat Has Best Taste

FROZEN beef should not be thawed before cooking but should be sawed or chopped apart while still frozen stiff, put on the grill or into the oven and cooked in that condition, allowing the thawing and the cooking to go on side by side. Meat so cooked will be tenderer and will have a better flavor than the same meat if allowed to thaw out before cooking.

Auto Wheel Makes Curb Sign Base

OF THE many things that can be made to serve as a base for a home-made portable curb sign, an old automobile wheel will probably be the most practical and satisfactory. It is light enough to be moved with ease and heavy enough to stay put — two qualities most essential. The pipe upright which holds the sign can easily and quickly be welded into the hub hole, as shown in the photo at the right. The other end of the pipe is flattened and bolted to the sign, made from a heavy sheet of galvanized iron.

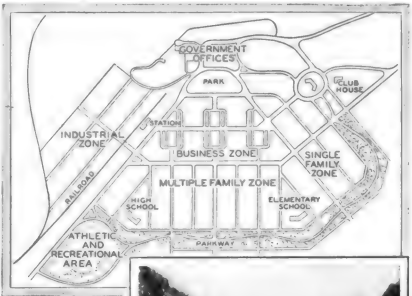


Curb sign is made by welding pipe in auto wheel.

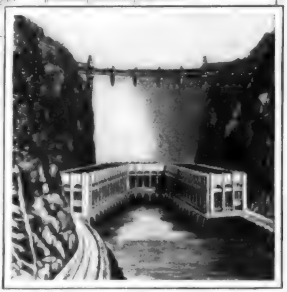
Small Modern City to be Built for Boulder Dam Workers

THE erection of the gigantic Boulder Dam—one of the most stupendous projects ever undertaken, costing approximately $165,000,000—will be accompanied by the construction of a fair-sized modern city to house the hundreds of workers of the dam. This city, tentative plans for which are shown at the right, has been scientifically planned by experts of the Department of Interior, and will have railway terminals, highways, granaries, and a number of public buildings.

According to forecasts made by engineers, Boulder Dam will be worth billions of dollars to the Southwest. Into the living rock of the Colorado river canyon, engineers will wedge a giant structure of steel and concrete to impound the river's turbulent waters, forming a reservoir over a hundred miles long. The dam will provide irrigation, flood control and hydro-electric power for the southwest.



The above drawing shows the tentative plans made by experts from the Department of Interior for the construction of a city to house workers of Boulder Dam. The city will have all modern conveniences, including railway terminal, highways, granaries, schools, and office buildings as well as amusement parks and athletic fields.



This artist drawing shows how Boulder Dam, built into the living rock, will look when completed.

Baby Bottles Feed Young Porkers

WHEN a family of his young porkers were orphaned at the age of two days. John Vincent, a farmer of Wayne, Michigan, constructed a novel feeding trough to supply the pigs with milk. The bottles were arranged on a board as shown below.

These young orphaned porkers are fed with milk from the trough and bottle arrangement shown.

Simple Mexican Tanning Process

MEXICANS of the southwest tan deer hides and calf skins which they use in making riding jackets and other articles of clothing in the following manner: The green hide is first thoroughly scraped with a dull knife. The hide is then soaked in a tub containing hot water and melted lard, after which it is again scraped thoroughly and scrubbed with soap and water. After wringing dry, the hide is smoked over a wood fire until it is both flexible and thoroughly dried out. The process resembles that used by Indians, excepting the substitution of lard for the brains of the animal killed. While a laborious process, it is said to produce good results as the hide makes comfortable and durable clothing.

Unsung Heroes

The iron men of the U. S. Lighthouse service risk their lives daily to maintain beacons stationed along dangerous coasts to protect ships from disaster, as told herein.

Lighthouse service men repairing the gas and whistling buoy at the entrance to New York Bay—an extremely dangerous task.

A service ship after weathering a wintry gale.

by **JAMES N. MILLER**

SIZZLING with action are the yarns that might be spun about the men of the U. S. Lighthouse Service. Scores have been trapped in lighthouses struck by lightning; others have stuck to their posts aboard lightships in the very path of violent hurricanes; while still others have been nigh unto death at dead of winter when their lighthouses became ice-bound and food and warmth were many miles away.

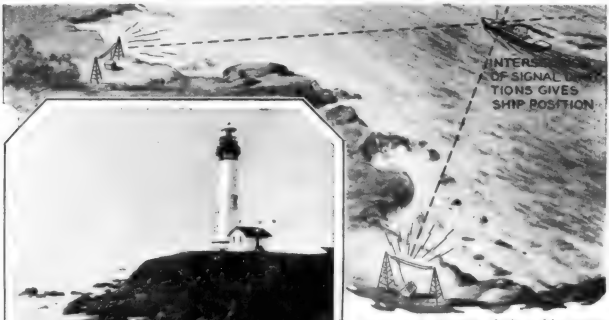
Which is to say nothing at all about the daring rescues achieved by men in the service. Again and again the official records tell of their much needed presence when sailing skiffs capsized, when yachts became disabled in heavy squalls, when motorboats struck rocks or submerged logs, when fishing parties grew careless and fell into the ocean, or perhaps when a seaplane lost its way in a heavy fog, crashed to the water's surface and drifted helplessly for miles in the midst of raging seas.

Not many people have been aboard a ship in the path of a violent hurricane and lived to tell the tale. Yet take note of this graphic account by the master of a lighthouse vessel who had just such an experience along the southern coast of Florida recently.

"We had a strong southerly wind blowing since noon, with the wind increasing to gale force by six p. m. and the sea getting higher all the time. About 8 p. m. the wind came around to the south-southeast, increasing to sixty miles an hour and driving up mountainous seas. Directly astern of us we could see the lighthouse flashing in our smoke.

"About 10 p. m. our ship took a great sea over her bow and trembled like a leaf, burying her nose halfway up to her jackstaff. It made me tremble, too, fearing that maybe we had broken our anchor chain. We knew that if our chain carried away it would be the end of our ship and crew; for we would be

of the Lighthouse SERVICE



Using radio direction finders, ships steaming along the coast can get their positions by taking bearings on the coastal station.

The Pigeon Point Lighthouse on the California coast, a typical isolated station, which serves to warn passing vessels of the dangerous rocks and reefs around the point.

driven back onto the reefs and smashed to pieces.

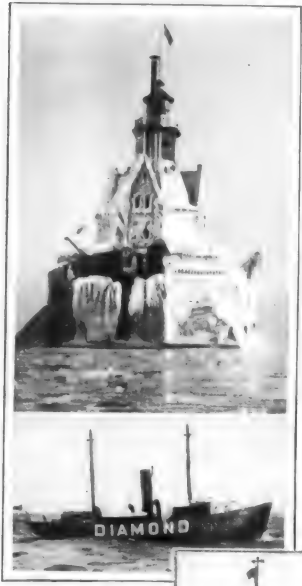
"By midnight the wind veered to the south, but kept increasing in force, at times rising to 75 miles an hour. Lucky for us, however, our chain didn't part, even though our ship took as many as a dozen mountainous seas over her bow.

"From midnight to four a. m. the wind was blowing at hurricane force, but was shifting to the westward all the time. The seas then began to flatten out, and by 6 a. m. the wind had let up a little. We were fairly well out of danger now, but it was sure a thrill while that southerly wind lasted. If our chain had carried away we wouldn't have had a chance."

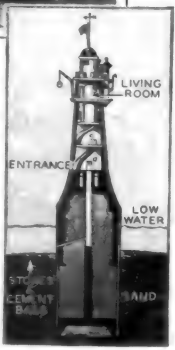
What is believed to be the most important lightship in the world has just been placed off Nantucket Shoals, Massachusetts.

Heavy seas breaking against Key West Station, which guides ships along the Florida keys.

Safety of Ships Depends on Nerve and Skill of Lighthouse Service Men



Upper photo shows the light station at Racine Reef, Wisconsin, covered with ice. During late fall and early winter months the lighthouse keeper is almost completely cut off from land by cold, stormy weather. Below — the Lightship or floating lighthouse, "Diamond," stationed in the region of dangerous shoals along the coast of North Carolina.



The photo at the right shows the construction of the new lighthouse at the mouth of the Weser river, in Germany. It is built on shifting sands in the manner shown. Entirely surrounded by water, it is anchored by stones and cement bags.

It is in the track of vessels plying between Europe and the port of New York and offers westbound ships their first opportunity of accurately determining their positions in relation to the rockbound coast nearby.

The new vessel is equipped with the very latest signalling devices and is the largest lightship in the vicinity, capable of maneuvering under its own power and of maintaining its position in all kinds of weather, even on such an exposed station, which is 41 miles from the nearest land.

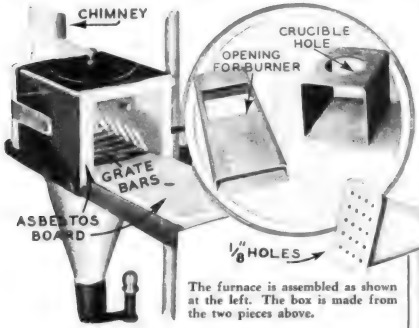
Lightships, which are virtually floating lighthouses, are maintained only where the construction of a permanent foundation would be impossible or at least very costly. These lightships serve the mariner by day as well as by night, for they mark the extremities of shoals and the turning points of the various channels. By day the ships themselves are visible, their odd shape and their names painted on the sides in enormous letters distinguishing them from all other craft. At night each lightship sends out a beam of light from its masthead, the flashes being so timed that one lightship can be easily distinguished from another.

Particularly helpful to the vessels passing near the lightships during fog are the fog signals. Some of these are powerful steam whistles, others are the more modern air operated sirens, while certain of the lightships are also equipped with radiobeacons, sending out guiding notes beyond the range of any audible or visible signal.

Only in the present decade has radio brought the navigator a help more valuable than any means given him since the mariners' compass became known. Each ship is now being provided with a radio compass, a rather simple rotating coil by which an operator can take bearings on the radio signals sent out by special beacon stations, lighthouses and lightships on which have been placed radiobeacons. Radio bearing signals are sent out from them on a known code during fog, as well as on a regular time schedule.

Today there are radiobeacons at the more important lightships and lighthouses along all the coasts of continental United States and the Great Lakes, with a few in Alaska and Hawaii.

A Gas Furnace for Your Workshop



The furnace is assembled as shown at the left. The box is made from the two pieces above.

IF METAL work of any kind is to be handled in the home workshop, a small handy furnace will be an indispensable piece of equipment for turning out workmanlike jobs. The furnace described herein meets most of the requirements—it is easily constructed and operated, and has a wide scope of uses, which may range from the heating of soldering irons to the annealing and tempering of small tools.

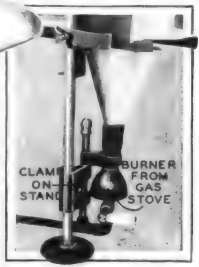
The furnace proper and the burner are designed in two separate units, both being supported on a stand very similar to a chemist's ring stand, thereby permitting adjustment of the burner and removal of the firebox.

The burner is made from any old gas stove burner you may be able to obtain. If of the ring type, the ring should be cut off so that a straight neck is left for attaching the cone. This cone, shown in the drawings above, is made of galvanized iron, and has its top perforated with a number of 1/8-inch holes. The edges are joined by the "double lapping" method.

It will be noticed in the photo that the pipe to the burner is "teed off" and a plugged nipple screwed into the tee. This arrangement serves as a support for the cone and for the burner neck.

The fire box is constructed from the two pieces shown in the photo at the top of the page, the shallow channel shaped piece with the rectangular hole for admitting the burner flame forming the bottom, and the square U-shaped piece, the top and sides. For a furnace of normal size, the firebox should measure about 2½ inches high, 3 inches wide, and 4½ inches deep.

The lining is made from ¼-inch asbestos board, or failing this, ⅛-inch asbestos shingle. The lining is so fitted that the top piece is supported by two side pieces, which are fastened on with only one screw each. This same screw also holds the strap that binds the back plate and chimney in place. This method of applying the lining allows it to expand without cracking.

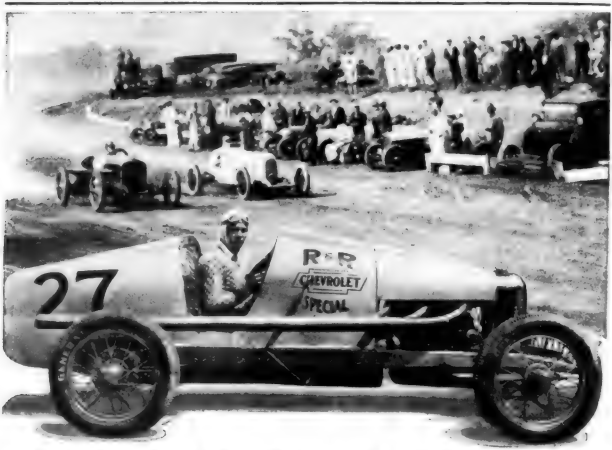


Furnace box and burner are supported by the pipe stand as shown. The gas pipe is "teed off" to take the clamps.

Across the rectangular opening in the bottom of the furnace, half a dozen 3/16-inch rods are placed to act as grate bars. The ends of these bars pass through holes in the lining pieces to permit easy replacement.

To make the chimney, cut out a piece of tin or sheet iron about four inches wide and ten inches long and bend it into a circle. This piece fits on the back plate, which has a hole through it to permit the gases to escape. The hole should have its upper edge about ¾ inch below the top of the fire box, so that a pocket is formed that prevents the heat from passing away too quickly. When all parts are assembled, all joints and cracks should be carefully filled with asbestos furnace cement.

Building a CHEVROLET



The body of this beautiful racer is only seventeen inches wide, is fully streamlined, and has been tested in the airplane wind tunnel at Dayton, Ohio. Above is a typical dirt track scene at a county fair.

Souped up Chevrolets are increasing in popularity each year on the dirt tracks throughout the country. This article, written by one of the leading race car designers of the country, tells you how to make your car into a speedy racer.

IN THE last two years "souped up" Chevrolets have challenged the supremacy of re-built Fords on the dirt tracks of the country, with considerable success. Our original Chevrolet Special in two years has participated in more than 200 contests. The picture of the car gives a good idea of what a trim little one man job it is. Eighty per cent of the car is standard Chevrolet parts, considerably more of the original car than is usual in converted racers.

My first step in rebuilding a Chevrolet for racing is to remove the motor, transmission and front and rear axles, and get them ready to install in the new racing frame. You can build the frame yourself, from instructions which I will be glad to furnish, or buy it ready made. This racing frame has a special spring suspension, and with special manganese steel motor and transmission mountings we get a straight line drive to the rear axle, thus eliminating friction and the loss of power in the universal joint.

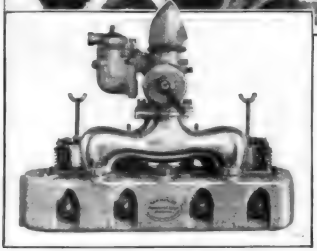
The frame can be built out of 16 gauge sheet steel, and should have a 92-inch wheel base from the center of one axle to the center of the other. Starting from the rear axle we weld on spring plates made from $\frac{1}{4}$x3$\frac{1}{2}$ flat cold rolled steel. From the center of the rear axle to the center of the spring plate the measurement is 13 9/16".

With the 92" wheelbase it is necessary to

RACE CAR

by **ROBERT M. ROOF**
Race Driver and Designer of Racing Cars

A bunched field after the first lap of a ten-mile dirt track race at Langhorne, Pennsylvania. The Chevrolet usually shines at such events, which are held annually at most county fairs.



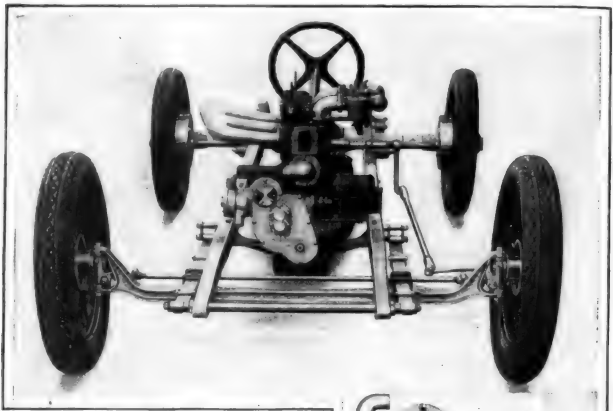
The giant racing eight-valve cylinder head developed especially for Chevrolet races. Note the direct down draft manifold system.

cut off the drive shaft to 39½" and the torque tube is cut so that when assembled in the differential gear housing it will measure 38½". The motor and transmission mountings can be purchased separately, or if you buy your frame they come with it.

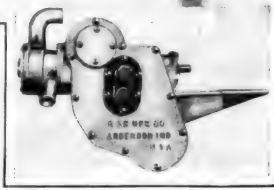
The most remarkable part of the stock Chevrolet rear axle is that it has a complete ball bearing assembly, and has proven to be just as fast and good as the axles used on the Speedway cars. The rear axles are supported on large ball bearings, and these ball bearings are carried in a grease packed housing, which automatically forms a safety hub. The wheel cannot come off if the axle breaks within the housing, and in two years of racing on the fastest dirt tracks in the country we have never had an axle shaft replaced in our car.

Another great feature of this rear system is that the external brake bands can be removed, leaving only the internal brakes, and the rear axle housing and brake drums can then be nickel or chromium plated, giving a clean and neat appearance to the car.

With this 1927 Chevrolet rear system it is possible to use either a 3 to 1 gear ratio, the standard gear, which is 3 9/11; the Pontiac gear, which is 4 2/11; or the Pontiac low or mountain gear, which is 4 8/10. The 3 to 1 gear is used for straightaway racing, the 3 9/11 on the mile dirt tracks and board tracks, and the 4 2/11 and 4 8/10 are used on half-



The Chevrolet racing chassis with the engine and equipment mounted, including the racing exhaust manifold, special dual intakes, and 4-in-1 drive.



The 4-in-1 magneto drive is made of aluminum and carries all gears in oil on ball bearings.

mile dirt tracks. Under the new AAA ruling it is permissible to remove all gears, including the reverse, for dirt track racing, but you must have a neutral position. With these transmission gears removed it greatly increases the speed, owing to the absence of friction in the gear box, while the oil in the transmission housing acts as a hydraulic brake.

In rebuilding the motor we recommend the following practice: The block is bored out to 3¾". The next step is to install the full pressure oiling system, the oil delivered from the pump at about 75 pounds pressure lubricating all main bearings and, through the drilled crankshaft, to the connecting rods. All oil ducts or leads in the main bearings are filled with solder. The large oil duct is cut in the main bearing, where the oil lines enter. There is a distributor connection which has six openings for oil leads. This distributor goes through the block opposite the camshaft side. The hole which is in the block is proper size to tap for 1 inch, 14 thread, SAE standard.

When the oil distributor is screwed into the block it permits three openings on the outside, one for the oil pressure line from the oil pump, one for the gauge and one for the overflow for the excess pressure line. All these openings are tapped ⅛" pipe thread and tubing fittings screwed into the openings. The three openings inside the block are fitted with ¼" copper tubing, the end opening feeding the middle main bearing, and the openings on the side for the front and rear bearings. There is in the block a ¼" hole for each main bearing, and these are flared with a drill or countersink and the copper tubing inserted, so that it will permit the full pressure for the main bearings, which, in turn, feed the connecting rods.

We have found that a solid skirt piston made in a chilled mold from a nickel-aluminum alloy is the best. Do not confuse this

piston with one that is die cast, as the outside of the piston is chilled and the inside cored. The piston described has a flat top, carrying a 1" full floating piston pin, and with this piston it is not necessary to plane off the top of the block to increase the compression ratio which is 8 to 1. With these pistons we use the Ford Model A connecting rod, babbitted for the pressure system and to fit the Chevrolet crankcase. This rod has proven very satisfactory owing to the fact that it carries a full floating pin and does not use shims on the crank end.

The racing fly wheel and Borg and Beck clutch have a total weight of only 24½ pounds. Owing to the very high r.p.m. the flywheel is made from one piece of forged steel, weighing 72 pounds in the rough, which, when finished, weighs but 12 1/5 pounds. That's a terrific waste of material, but it is necessary for the protection of the driver, as, at 5,000 r.p.m., an inferior flywheel is apt to burst at any moment. Model T Ford metals are welded on the clutch and brake, as they do not take up much room in the narrow one-man body.

The standard Chevrolet crankshaft gives good service for racing after it has been hollow drilled for the pressure system.

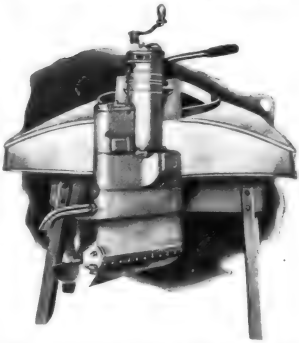
The photo shows the racing chassis with engine and equipment mounted, including the racing exhaust manifold, the special dual intakes, and the four-in-one magneto drive which we developed for this racing car. The latter is mounted on the front of the block with five 7/16" fillister head cap screws which formerly held the front gear housing.

The four-in-one drive is made of aluminum and carries all the gears on ball bearings in oil. On the front cover of the magneto drive is located the oil pump, which is driven from the end of the cam shaft. This oil pump runs at one-half the motor speed and delivers a pressure of seventy-five pounds or more at the crankshaft. The pressure is regulated by means of a by-pass valve. The oil is taken into the pump through a ½" copper tube, placed full length of the bottom pan, and with a number of ⅛" holes drilled in it. The screen is around the outside of this tube and a coarse one is used to permit the oil to enter fast enough. The tube is connected to the pump with a ½" rubber hose.

On the title page is shown the giant racing eight-valve cylinder head which we devel-

(Continued on page 209)

Outboard Operates Under Water



This new outboard motor has engine and exhaust located under water as shown. Operating the tiller turns the entire engine, thus eliminating gears.

POSITIVE instant control is achieved in the steering of a boat by means of a new outboard motor recently placed on the market. The engine, shown in the photo above, has its cylinders and exhaust located under the water, so that the whole motor is moved when the tiller is operated. This arrangement also saves loss of energy by eliminating the gear system common to other types of engines. It is attached to the stern of a boat in the ordinary manner.

Heatless Light Stimulates Heart

APPLYING cold light to the heart, stomach and other internal organs is a new medical treatment devised and advocated by an eminent Berlin physician. Ordinary sources of light, like arc lamps or incandescent lamps, cannot be used to produce very intense light beams for bodily treatment because the rays from these lamps contain a large percentage of heat. By means of special optical apparatus, however, scientists have been able to obtain beams of pure, cold light rays, from which the usual heat rays have been removed. These beams of intense cold light would instantly paralyze the eye by their brilliance, but to the skin and other organs they do no harm, and it is found that they will penetrate to depths of from one to two inches.

Mower Mounted on Boat Clears Large Reservoir of Lilies

Cutter bar for this "lily nipper" is from a standard farm mowing machine. Depth is regulated by a differential pulley.

THE problem of mowing a heavy growth of pond lilies from a fifty-acre reservoir resulted in the ingenious "boat mower," shown in the accompanying illustration.

The flat-bottom scow is driven by a 35 h.p. motor, which operates the cutting mechanism as well as propels the boat. The flywheel of the engine was removed and replaced by a spur gear. Between the cutter bar and the motor was placed a clutch and transmission gear so that the boat could be propelled without the action of the cutter.

Neon Tubes in Chandelier Form Now Being Used in Interior Lighting

NEON tubes have been employed for several years in electric displays, but their value for interior lighting has only recently been discovered. By combining neon tubes of different colors into the forms of chandeliers, a nearly white light is obtained that is more restful and more efficient than the light given off by incandescent bulbs.

Another advantage is that the tubes can be bent into all kinds of decorative designs, one of which is shown in the photo at the right.

Rocket to Test Upper Air

IN THE near future, when Dr. R. H. Goddard perfects his long distance rocket at his camp in Roswell, New Mexico, man may be able virtually to achieve an altitude of 50 miles to study atmospheric conditions. This rocket, which is now nearing completion, is to be equipped with automatic recording devices that will both capture a sample of the air and register the conditions existing in the upper atmosphere. When the rocket explodes in the sky, the instruments will descend slowly to earth again by a small parachute.

Dr. Goddard's experiments are being supported by the Smithsonian Institute in Washington.

Neon tubes, commonly used in electric signs, are now being put into service to form chandeliers and wall lights, as shown in the above photo. When arranged in various colors, they suffuse a near-white light over the room that is restful to the eyes. The tubes can be bent to form very attractive designs.

Australians Import Bugs to Combat Spread of Cactus

ALTHOUGH insects may make life miserable for a farmer by eating up his crops, some species of the pests have their good points—they destroy plants that are harmful, thus doing a little good along with the bad. A case in point exists in Australia, where farmers have imported thousands of bugs, beetles, and caterpillars to halt the spread of the prickly pear cactus, which, already having overgrown about sixty million acres, is spreading at the alarming rate of a million acres a year.

This photo gives some idea of the thickness of the cactus plant growth in various areas in Australia. Thousands of cactus weevils like the one shown at the right are being imported into the country to exterminate the plants by devouring them.

These bugs, one species of which is shown at the right, eradicate the cactus by the simple process of devouring it. One of the worst and most harmful varieties is fast falling before the onslaught of the voracious bugs, and it is reported that if the insects' appetites hold out the plant will vanish within a few years.

Some idea as to the thickness of the cactus growth can be gained from the photo above. The plant grows so thickly that it chokes out all other plants and renders the soil unfit for cultivation.

New Tennis Racket Can Be Taken Apart at Handle and Carried in Grip

A NEW tennis racket recently displayed at the International Exhibition of Inventions in London has a detachable handle which permits the racket to be knocked down and carried in a small suit case, as shown in the drawing at the left.

The two parts are screwed together and held firmly in position by a catch when in use on the courts. This invention will be a great boon to week-end guests, as it eliminates the old canvas carrying case which is so awkward and difficult to handle.

The new tennis racket can be taken apart as shown above. The parts are screwed together and held firmly by a catch.

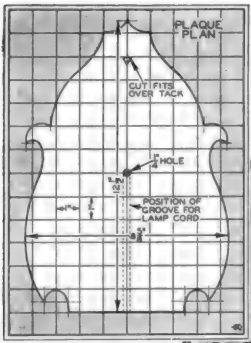
Venus' Foot as Model

AS a means of turning the modern fashions in footwear from the present unlovely and unnatural shapes to more natural and beautiful ones, British boot manufacturers are advocating that the foot of Venus de Milo, or other famous feet of beautiful women be taken as a model for feminine footwear as a means of curing feminine foot troubles.

Wooden Monkey

by DALE VAN HORN

Here's a wall light for the den or living room that will command attention by its uniqueness.

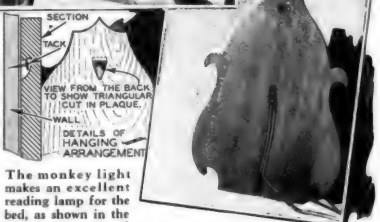


The design for the plaque is shown above. Outline on the chart is traced on the wood and cut out with a scroll saw.

WALL lights of unique and striking design will go a long way toward giving distinction to any room, and by constructing this simple and easily-made monkey light you can display your originality and ingenuity in the field of interior decoration. Such a light is suitable for a variety of places—in the hall, over the bed, on the porch, or on the walls of the living room or den. The light shown here is extremely simple in design, but you can go a step further and paint in, in your own colors, the facial features, tail, legs and arms, of the monkey and — to go the limit — utilize a hollowed-out cocoanut for a light shade.

Only two pieces of wood are needed, one for the plaque that goes against the wall, and the other for the monkey-shaped light holder. The accompanying cutout charts of squared paper show the shapes and sizes of the two pieces. Using these charts, trace the designs out on two pieces of clear grained white pine, ¾ inch thick, or on 5-ply wood, and cut around the outlines with a bandsaw, coping or scroll saw.

The next task is to bore the one-fourth inch holes in the light holder for the lamp-cord. The utmost accuracy and care are necessary for this job. It is best to bore half way through from one side, and then reverse and bore out the rest from the other side. Next bore another hole up through the underside of the hands to meet the first hole. Finally run the lamp cord through the holes and plug up the hole in the front of the



The monkey light makes an excellent reading lamp for the bed, as shown in the photo. Rear view of plaque shows lamp cord groove and notch for hanging to wall.

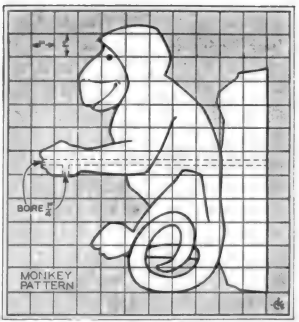
hand with putty, smoothing it down carefully with a small knife blade.

This much done, let us next tackle the plaque. First determine the exact place where you will fasten the holder, then bore a hole through the spot for the lamp cord. Be sure to see that the monkey is fastened on vertically and in the center. A mortise and tenon joint will be the most efficient means of join-

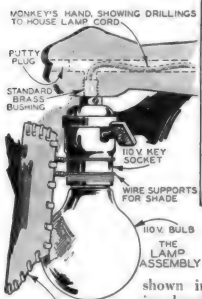
Holds a Light

ing the two pieces together. The joint should be reinforced with the best quality glue and a few small nails driven in through the back side. Failing this, however, you can make a surprisingly strong joint by simply coating the rear edge of the monkey with glue, and reinforcing the joint with nails as in the first case.

Now, cut a small groove down the back of the plaque, reaching from the lamp cord hole to the bottom of the piece. Then draw the cord up tightly so that the bushing on the socket fits firmly in the hole in the monkey's hand, and fasten the cord down firmly in the back with small staples. The plaque is hung on the wall by means of a triangular notch cut near the top, ¼ inch deep, to take the head of a small nail protruding from the wall, as shown in accompanying drawings.



The design for the monkey is shown above. This piece is joined to the plaque by means of a mortise and tenon joint.



Left—The lamp cord is run up through the hole in the hand as shown. The short hole should be threaded to take the socket bushing. Above—This photo shows the completed light.

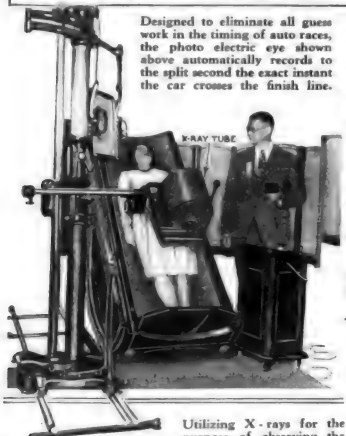
Finally, rub the entire light down thoroughly with fine sandpaper, and give it two coats of dark brown paint. When the paint is dry you can outline the various features of the monkey's body with black paint to add realism. When cutting out the tail of the monkey with the bandsaw, you may have to cut right through at one point to get at the enclosed loop. However, in finishing, you will have to work glue into the opening and close it up with a small nail.

The design for a simple shade is shown in the accompanying drawings, but a more striking one can be made from a large elongated cocoanut. First, saw off one end of the cocoanut evenly and remove all the meat. Then saw off enough of the other end to accommodate the light socket. Fit the socket inside the shell and apply some plaster-of-paris to the cut off portion at the top for a neat finish. The hole in the bottom should be large enough to admit a light bulb. The inside of the shell is finally painted white for better illumination.

To make a neat wiring job, it is advisable to locate the light directly over a wall outlet, or as near to one as possible. This saves stringing unsightly wires across the wall. The drawing shows a key socket, but a socket with a pull chain can be utilized for greater convenience.

LATEST Developments in the

Designed to eliminate all guess work in the timing of auto races, the photo electric eye shown above automatically records to the split second the exact instant the car crosses the finish line.



Utilizing X-rays for the purpose of observing the operation of the digestive organs within a patient is the latest development in the field of radiological science. In the recent public demonstration held by the American Radiological society, the patient was placed on the specially devised X-ray table shown in the photo above.

Electricity now operates the barber's scissors. The inventor, Alfred Rhea, of Los Angeles, shown above, claims that his new shears will cut the average time for a haircut from twelve minutes to four minutes, and in addition, eliminate the strain on the barber's fingers. Power is delivered to the shears by a long flexible cord which enables the barber to work in any position. The shears weigh slightly more than the common scissors.

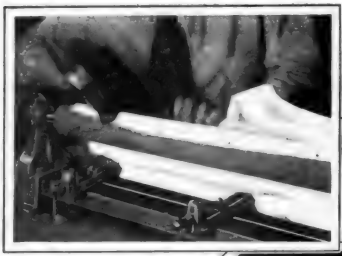
Field of Electrical Inventions

Electricity, man's most obedient and inexpensive servant, is nowadays invading every field of activity, from medicine to auto racing, and excelling human agency in performing the tasks there, doing the work in a shorter time and in a more efficient manner. Timing racing cars, curing ills, locating breaks in water pipes, opening doors, and cutting hair are some of latest achievements.

Door opens automatically when waitress crosses light beam. Mechanism is actuated by a photo electric eye.

The new Aquaphone, a recent German invention for locating breaks in underground water pipes. The two super-sensitive microphones, which pick up the sound of the flowing water, are moved along the pipe to the point where sound is the loudest and where they give equal volume in headphones worn by operator, as is shown above. This device saves labor of digging to locate breaks in the main.

A Pumice Stone Buffer



The muslin is tacked to the wood cylinder as shown, with the center a little ahead of the edges to take up slack and prevent wrinkling of the cloth.

For giving a fine finish to woodwork, rub powdered pumice well into the cloth. Powdered emery can also be applied in the same manner.

PUTTING a fine finish on a piece of home-made furniture is a long, tedious task if you do it by hand, but if you have a lathe available you can make, at a cost of less than $1.25, a spindle shaped, motor driven buffer that will do the work in much less time. All that is needed is a block of redwood three inches square and 30 inches long, and two and a half yards of heavy muslin 54 inches wide.

The first thing to do is to turn down the wood block on the lathe to a cylinder about three inches or less in diameter, which, by the way, must be uniform to prevent wrinkling of the cloth. When the cylinder is finished smooth it off with sandpaper in the usual way.

Next cut the cloth to a width of 27 inches and tack the edge in place, starting the center a little ahead of the edges to compensate for slack, as shown in the photo at the top of the page. Then turn the cylinder slowly with the tail stock screwed up rather tightly, and as each half turn is made, run the hands, spread open, from the center towards the ends, so as to take out all wrinkles, the idea being to wrap on the entire strip of cloth with no wrinkling whatever.

When all the cloth has been wrapped on, tighten the cloth up well, then fasten in place with one-half-inch brads, countersunk down well into the cloth, so that there will be no danger that the heads will touch the surface which is being polished.

The buffer is now ready to use. It will make an excellent polisher for waxed surfaces, and other flat or curved wooden pieces. For giving an almost mirror-like surface and removing all high spots in a final dressing, it is a good idea to sprinkle powdered pumice all over the roll, the while rubbing it well into the cloth. In the same fashion, you can also dust in powdered emery.

In time the outside surface of the cloth will become soiled with much use. All you need to do then is to pull out the brads, cut off a turn or so of the soiled fabric, and tack down the edge again, thus giving an entirely new surface. The buffer should last at least 15 or 20 hours.

Modern Whaling Methods Exterminating Sea Monster

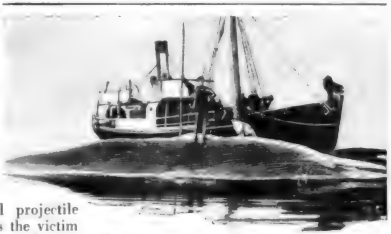
BEING a whale is no joke nowadays. His much pursued and coveted species is being slaughtered to such an extent that a whale is today about as lonesome a creature as there is.

And the modern harpoon gun! Wow! What chance has a poor old whale got when this cannon-like machine, mounted on a modern whaling boat, sends forth its powerful projectile containing a bomb which enters the victim for a distance of about six feet and then explodes?

The modern harpoon makes the slender, old-time hand harpoon appear about as inefficient as a toothpick. But this terrible modern projectile is too efficient; according to present indications, there will some day be no more whales left for it to hit. This last colossal creature on the face of the earth is doomed to trail along the path to extinction after its former fellow-creatures, the dinosaurs, and other prehistoric monsters.

There is a large whaling company on the Pacific coast that regularly sends out whaling ships to ply the southern Pacific waters and sometimes, so a captain of the company says, it takes a whole month to catch two or three whales. And it is rare indeed to capture seven or eight in a single month. Sometimes the crew has to chase a whale for days and keep on his trail day and night.

But following a whale is comparatively easy because it is a mammal with a pair of lungs which must be kept full of air. It has to arise to the surface at frequent intervals to breathe. The cry of old, "He blows!" means that the monster suddenly comes in sight and there is his great black, island-like bulk like a dark blotch on the blue waters.

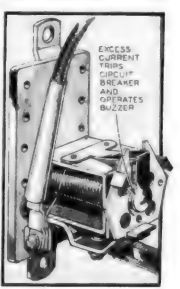


Riding the catch to dock. The harpooned whale is first inflated with air to keep it from sinking.

Circuit Breaker Guards Wiring

THE manufacturer of a popular line of medium priced American cars has recently installed this ingenious circuit breaker as standard equipment.

The device protects the electrical system from short circuits and eliminates the inconvenience which often occurs with burnt out fuses. In the event of a short circuit a buzzer sounds, warning the driver that trouble has developed in the ignition or lighting system. The circuit breaker, which takes up but little space, is mounted on the reverse side of the instrument board.



Device ousts ignition fuses.

Two Drivers Needed for British One Hundred-Ton Articulated Lorry

The swan-neck hinge of trailer shown above is provided with hydraulic jacks which raise or lower the front of the trailer.

THIS 100-ton lorry, in use by a British ship-building company, has the weight so equally distributed over its twenty-two tires that it will not damage roads or bridges. A special gear box gives six speeds forward and two in reverse, the highest speed being only six miles an hour.

Build a Miniature Mansion

Small yet commodious, this Spanish type bungalow has all the beauty and charm of costly mansion.

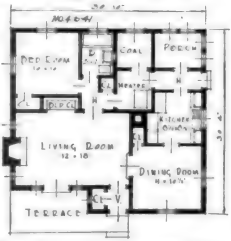
by MAURICE I. FLAGG

A home that "looks like millions," yet costing only a moderate price, can be built by taking advantage of certain "stock" materials available at any lumber yard. Plans and advice offered here will aid you in constructing your home.

Simplicity and charm mark interior furnishings.

TO SAY a thing "looks like a million dollars" is a favorite American exaggeration. Yet when most people build houses that's exactly what they want; namely, a million dollar eyeful that can be had at a bargain price. All of which is not so difficult to achieve these days if you take advantage of certain "stock" materials which appear more costly than they really are.

In the old days of hand labor only the rich could afford the details and trimmings that dressed a house up, gave it style and swagger. Today, however, manufacturers have perfected machines that reproduce interior finish and architectural details by the world's great designers and at prices so reasonable they are within the reach of the leanest purse. Made in volume and in a variety of styles these details are stocked by almost all lumber dealers or they can be obtained on short notice.



Spanish bungalow floor plans, 4-S-41.

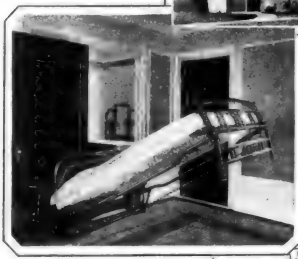
All of which means that even though your house is small and inexpensive, it

at KITCHENETTE COST

HOW TO GET A BLUEPRINT AND TWO PLAN BOOKS

A one-sheet blueprint of any house appearing in Modern Mechanics magazine may be had for $1.00, postage prepaid. Two new plan books, HOMES FOR NEWLYWEDS, containing 32 of the latest ideas for low cost homes in all styles, and 16 SELECTED HOMES FOR LEAN PURSES containing time, space, and labor-saving bungalows, may be had for 15 cents each, or both books for 25 cents, postage prepaid. Address Home Building Editor, Modern Mechanics Magazine, Minneapolis, Minn., for blueprints and plan books.

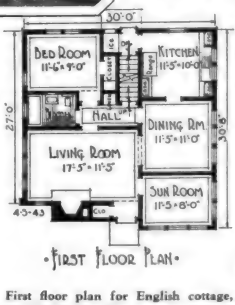
Finished in Stucco, the charming English cottage type home above has extra story for bedrooms.



A closet for fold-away bed, as shown above, converts living room into emergency bedroom.

I mention this to call attention to how really inexpensive it is today to build beauty and refinement into even tiny houses, as compared to the cost 20 years ago. Remember this point: it's not the size or the price of the house that gives it distinction and sets it apart from others as a work of art. Usually it is due to the artistry and skill of some clever designer who uses common materials uncommonly well, and takes advantage of the availability of "stock" materials, procurable at a surprisingly low cost.

Therefore if you are long on ambition and short on cash and are delaying building because you've a notion it requires a fat pocketbook and a lot of money to build a home with fine appearances, you'd do well to look around. You'll find countless finishes, details and equipment that are inexpensive, relatively speaking, due, as I have said, to machine-made mass production by present day manufacturers. But take my advice. Don't go at it alone. Get the help and advice of some-



First floor plan for English cottage, No. 4-S-43. For blueprints, send $1.00 to Modern Mechanics Building Editor, 529 So. 7th St., Minneapolis, Minn.

need not lack the qualities of refinement and beauty found in mansions running into thousands of dollars.

Only the other day I saw a reproduction of a fireplace mantel in a famous "down south" Colonial mansion. It was like the original in every respect but two. It was not handmade and it cost several hundred dollars less to produce. As a "stock" pattern it retails through lumber dealers for less than $100. Made by hand, it would be beyond the reach of the average medium-salaried home builder.

one with experience in the field. A "Mansion Appearance at Kitchenette Cost" is a matter of selecting the proper materials with skill and care.

The Spanish bungalow, No. 4-S-41, and the story and a half English cottage type house, No. 4-S-43, are two extremely popular houses. Diminutive as they are, they are none the less serviceable, attractive, commodious and stylish to the nth degree.

Let's look into the equipment and study the plans. In No. 4-S-41 you have a detached home in Spanish style, with cream stucco exterior finish, red tile roof and flat wall surfaces relieved by shadows cast by porch, terrace and chimney projections. While perhaps the exterior appears severely plain, it is nevertheless in the spirit of the style. With a colorful terrace, awning, red roof and appropriate plantings around the house, you will have a stylish little place.

The bungalow can be built either with or without a basement. While there is only one bedroom, a specially designed closet in the living room accommodates a roller type or wall bed for emergency purposes.

A feature of the living room is the fireplace. French doors open onto the terrace, which might be enclosed if you want more living area. And the house is frame construction, with stucco on metal lath and fully insulated. It can also be built of hollow tile or may be brick veneer. According to the estimate of the designer, this is a $5000 house under normal conditions.

The English Cottage story and a half house, No. 4-S-43, offers complete bungalow equipment on the first floor and added space above for sleeping rooms. The house is brim full of style, and as far as appearance is concerned it looks to be considerably larger than it really is. You have a living room, sun porch, dining room, bedroom, kitchen and bathroom on the first floor. There is space above for two more bedrooms if you require that many. An outstanding feature is the window area. There are nineteen windows on the first floor, providing plenty of sunshine.

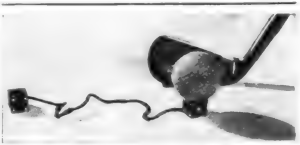
As the house stands it is frame, with stucco exterior and shingle roof. There is a full basement. A fireplace is a living room feature. This, too, is a house that has mansion-like qualities, and at the designer's suggested price, $6500 to $8500, it is a reasonable house to build. The above figures are only suggested price ranges and not a guarantee.

"Water Bike" for Swimming Sports

New "water bike," shown above, is driven by foot power. It furnishes great sport at bathing beaches.

ONE of the latest pieces of sporting equipment for bathing beaches is the unique "water bike," which carries the swimmer along through the water by means of a propeller geared to a foot pedal operated by the swimmer, as shown above. Buoyancy is provided by a wood frame.

New Golfers' Tee Like Dice



These new tee dice have concave faces for balls.

A NOVEL golf tee in the form of a pair of dice, recently placed on the market by a Portland, Oregon, firm, is gaining wide popularity. Each dice can be used as a tee, as they have concave faces to hold the ball. A stout cord twelve inches long holds the two dice together, the one not being used for a tee acting as a loose anchor for the other in case the latter is hit by the club. For a higher tee, one dice is set on top of the other.

SWOOP LIKE AN EAGLE!

Split the wind, with the keen air fanning your face, and the red blood zipping through your veins!

In all the sports, there's no thrill like motorcycling—astride a 1931 Harley-Davidson. Here is speed that just melts the miles—power that laughs at hills—getaway that nearly takes your breath away.

Let your nearest Harley-Davidson Dealer show you the amazing new Twins, and the thrifty Single. Ride one or all of them—see how easy they are to handle—get the thrill of their performance. See him soon.

Mail the Coupon for Illustrated Literature showing the new 1931 Motorcycles and Sidecars.

Ride a
HARLEY-DAVIDSON

HARLEY-DAVIDSON MOTOR CO.,
Dept. MM, Milwaukee, Wis.
Interested in your motorcycles. Send literature.
Name.....
Address.....
My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, ☐ under 16 years. Check your age group.

LUMINOUS PAINT

Make Your Watches, Clocks, Etc., Visible by Night The very latest discovery in the scientific world. Utterly, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which we supply at a reasonable price. Think of it! Your watch, clock, or anything else you paint with this, will SHINE IN THE DARKEST NIGHT, THUS NEED NO MATCH TO LIGHT IT SHINES. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time of night. Use it to outline or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Crucifixes, Luminous Rosaries, etc. Send 10 cents, price 25c, larger size, 50c and $1 postpaid. JOHNSON SMITH & CO. Dept.964 RACINE, WIS.

CIGARETTE MAKER

Roll your own and save money. Better and quicker than more than half. Use your favorite brand of tobacco. Fine, medium or coarse cut. Pocket size, weighs ½ oz. Made of metal, nickel plated. Size, 3 for 60c., 6 for 90c., bring cost [illegible]. Only 25c postpaid. Handy carrying case 10c extra.

GOOD LUCK RING

Very striking, quaint and unusual design. Silver finish; cross with crossbones, death's head and two brilliant, flashing gems in the eyes. Solid to the back. Only 25c postpaid. Handy carrying case 10c extra.

Exploding Cigarettes

Has contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is taken one-third smoked, the victim is very much surprised as it goes off with a loud BANG! The remaining nine cigarettes are unsmokable after the explosive has been used. Only 25c postpaid. Handy carrying case 10c extra. Price 25c a box.

NOVELTY BADGES

Timing Pencil 10c Sugar Inspector 10c Each is a colored metal badge, nickel plated, that you can wear on your coat lapel or pin to your dress. Send 10c. each, or both for 15c., or 75c per doz. postpaid anywhere.

SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. As the victim goes to strike one he gets quite a surprise.

10c

Price 10c per box, 3 boxes for 25c, 12 for 75 cents.

MIDGET BIBLE

GREAT CURIOSITY. Smallest Bible in the World. Size of a postage stamp. Contains 200 Pages. Said to be the finest book [illegible] ever printed. Has 3 maps and 24 pictures of art. Must be seen to be appreciated. Make good money selling them to friends, church entertainments, etc. Price each, 10c, 6 for 50c, 12 for $1.25, 100 for $7.50. Also obtainable in Leather binding, with gold edges, price each, 3 for $1.25, $4.50 per doz. Magnifying Glass for use with Midget Bible, 10c extra.

STAR TOY MAKER

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, Telephone, Boomerang, Telescope, Kaleidoscope, Electric Motor, Electric Lamp, Microscope, Electric Motor, Electric Bell, Water Wheel, Paddle Raft, a pair of Skis, Dog Sleigh, Kite, Magic Lantern, Microscope, Electric Motor, Electric Bell, 64 pages. 100 illustrations. PRICE 10c.

AMATEUR ELECTRICIAN. Shows how to build up in simple language. How to make batteries, dynamos, motors, bells, telephones, electric call systems, electric clocks, etc. Price 10c postpaid.

BOOK ON ROPE SPLICING! Useful knots, hitches, splices, and how to make them. Many are simple and what they are used for, knots that every boy should know. 100 illustrations. Also how to splice ropes, tackle blocks, tackles, etc. PRICE 10 CENTS.

STAGE MONEY

Withabunch of these bills, it is easy for each person of limited means to appear a prosperous gambler. Proper time and peeling off a couple bill or two from the outside of the roll, the effect created will be found to be all that can be desired. **Prices, postpaid: 40 Bills 20c, 120 for 50c, or $3.50 Thousand postpaid.**

Wonderful X-Ray Tube

A wonderfullittle instrument producing optical illusions, both surprising and mystifying. By its use you can see what is apparently the bones of your hand as in a bad picture. Practice or opening in a fine stem, and many other amazing illusions. Price 10c, 3 for 25c.

NOSE FLUTE

The Magic Nose Flute, or Submarine Nose Flute is a novel musical instrument that is played with the nose and mouth combined. There is one a scale is played it which, when once accustomed to its use, will produce very sweet music. It somewhat resembles a flute. There is no fingering, and even those who know not one note of music will fascinate and keep others pleased as they would be to a piano or any other musical instruments, the effect is so charming as it is surprising.

Post Paid 10c

NOSEBLOWER

When some men blow their noses it sounds like a fog horn. The NOSEBLOWER is the latest novelty to torment us. It is a device that is ingeniously concealed in the handkerchief. You need to blow your nose and your friends will think they have a steam engine or something. You can blow the loudest noise to your hearts' very bad cold and keep up the fun as long as you like. Price 10c, 3 for 25c, or 75c per doz.

Serpent's Eggs

Box contains 12 eggs. When lighted, small, coiled, irregularly hideous limit into a snake several feet long, which will crawl toward about in a most lifelike manner. Price per box, 10c postpaid 3 for 25c

BLANK CARTRIDGE PISTOL

Protection against Burglars, Tramps, & Dogs Special Offer 1 Blank Cartridge Pistol 100 Blank Cartridges 1 Cartridge Belt ONLY $1.50 The List Shipped by Express Only Cash or Money Order

Well made and effective, made solely on latest type of Revolver; appearance and size is enough to scare a burglar. When loaded it may be as effective as a real revolver without danger to life. It takes standard Blank Cartridges—Shotgun Cartridges where. Specify caliber when ordering. Superior quality Blank Cartridges Pistol, 100 Blank Cartridges, and our new 832 page De Luxe Catalog of latest novelties, all for ONLY $1.50. Shipped by Express only. Cannot go by parcel post. Extra Blank Cartridges 50c per 100. Special (Holster (Cowboy Type) for pistol 50c. No C.O.D. shipments

LOOK 35¢ LOOK Wonderful Instrument.

Greatest thing yet. Nine instruments in one. Everything illustrated with it. Odd, Curious and Interesting. Lots of pleasure as well as very useful. It is a Double Microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a pocket Mirror, and a Laryngoscope—for examining eye, ear, nose and throat. It is worth all the cost to look at one small object under its eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail, **Only 25c or 3 for $1.00**

Watch Charm Pistol $1.00

Exact reproduction of a real pistol, called the REAL BLANK PISTOL. Made of metal in exact imitation of the latest model. Will not injure anyone, but has a terrifying look. Fine for scaring or attacking to frighten off dogs, etc.

Loads like a regular pistol. Pull the trigger and it goes off with a loud bang. Parts in brass open fine workmanship. Length of pistol, 6 inches. Made entirely of high grade steel, nickel plated, octagon barrel, handsomely engraved. Weight, 1 lb. Price, $1.00 each, postpaid. Special Offer: 2 Pistols and 200 Blank Cartridges, 50c per box of 25 (shipped by Express)

PISTOL CIGARETTE CASE

It looks like a deadly weapon, but it is merely a novel Cigarette Case. This clever contrivance has proved itself better than the real thing in many an awkward encounter. Great fun shooting up your friends. Thin model and protest it mists be loaded. Pull the trigger and the cigarette flies open disclosing the cigarettes. Well made, fine finish and compact. Weight only 2 ounces.

PRICE POSTPAID 25c

MICROPHONE TRANSMITTER BUTTON

You can easily make a highly sensitive detectophone by using the Microphone Transmitter Button in the sound wave. You can build your own audiphone, which hearing the deaf can hear clearly, simple and inexpensive. You can install an outfit in your house whereby conversations being held anywhere in the house. You can connect up different rooms of a hotel. That night wall safe by means of a secret operations during the war. It is being used in many ways. It is a wonderful invention. You can connect the button almost anywhere—card board boxes, stove pipes, radiators, on the wall behind pictures, mirrors, etc. Button is so light and small it cannot be detected. Person can be overhead without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph in place of other sound instrument, can be heard hundreds of feet away. Button may be used to receive telegraphic communications; other makes an old fashioned telephone. The ideal microphone for radio use; surpasses all carbon granule devices. Many other similar uses will suggest themselves. Experimenters find the button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce sounds. Without sound waves. PRICE $1.00. JOHNSON SMITH & CO., Dept. 964, RACINE, WIS.

LATEST CATALOG Johnson Smith & Co. Racine, Wis.

JOHNSON SMITH & CO.

Dept.964 RACINE, WIS.

A De Luxe Edition of our new CATALOG mailed on receipt of 25c. Handsome binding. Bigger and better than ever. Only book of its kind in existence. Nearly 800 pages of all the latest tricks in magic, the newest novelties, jokes, puzzles, novelty advertising devices, rubber stamps, interesting books, curiosities in seeds and plants, etc., numerously illustrated. Remit by Coin, Money Order, Check or unused U. S., Canadian and Foreign Stamps for all articles listed above. Do not send personal

BOYS! BOYS! BOYS!

THROW YOUR VOICE

Into a trunk, under the bed, under a table, back of the door, into a desk at school, or anywhere. You get lots of fun fooling the teacher, policemen, peddlers, and surprise and fool all your friends besides.

The Ventrilo

is a little instrument that fits in the mouth out of sight. Cannot be detected. Used in connection with the above, with the aid of this wonderful DOUBLE THROAT, or VENTRILO, you can imitate many kinds of birds, animals, etc. Remember you get everything for ONLY TEN CENTS—a booklet giving you full instructions how to become a ventriloquist and throw your voice, the Double Throat, or Ventrilo, and our big catalog of novelties, tricks, puzzles, music, books, etc.

All Sent Postpaid to Any Address for Any 10c

THE DANDY PERISCOPE

Very Interesting and Amusing Novelty

SEE WITHOUT BEING SEEN

Look Over the Heads of the Tallest Men in a Crowd.

See Over a Fence, Around Corners, Etc.

LOTS OF FUN AND AMUSEMENT

Strongly Made. Equipped with Mirrors, Sight-Finder and Eye-Piece.

THIS is the same kind of instrument that the soldiers use in the trenches to watch the enemy without risk of being seen themselves, and every schoolboy has one to project above the surface of the sea to keep a look-out for other vessels. With it you can guard against a lady's wall or see around a corner without being seen yourself. Look in the eye-piece, you can look high over the heads of the tallest men and watch all the fun. The illustrations will show you how to use it. The mirrors from which the Periscope can be put. Every Boy should have one for spying and anyone else who wants to see around corners. The Dandy Periscope is very strongly made, will stand the roughest handling and the hardest wear, and with ordinary use should last a lifetime. It measures 17 inches long, and a little over two inches wide. The Periscope Tube is handsomely nickeled with colored trim to show many of the parts and each Periscope comes complete in box.

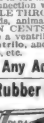
Price Postpaid to any Address.....$1.00

INVISIBLE INK

The most confidential messages can be written in with this ink, for the writing is absolutely invisible. Keep your notes and other private matters entirely away from prying eyes. Only 15c a bottle; 3 for 40c.

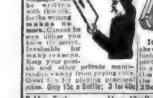
Rubber Chewing Gum

It is just like a regular package of chewing gum and looks so real that it takes experienced eyes to detect it is not genuine until they start to chew it. Here's a world of fun in the rubber chewing gum — 5 sticks to the package. Price, 10c. Pkg. 2 for 75c postpaid.



Rubber Tacks.....Box 10c Rubber Cigarettes..Price per Box 20c
Rubber Cigars, Price Ea. 10c Rubber Pickles, Price of Pkg. 10c

U. S. BABY TANK



It goes with real Yankee Pep—by its own power

Made absolutely true to life. Inspected. By drawing the Tank backward, either with the hand or over the floor on the table, it winds up a powerful spring, and upon releasing all obstacles, in the shape of chairs, etc., the heavy Tank thus proved its ability to go over. What makes it go is somewhat of a mystery, for there is no need to wind up as is usually under Wood with metal tips for use

25 Cents

this Tank will keep plodding along ten times longer than the ordinary Tanks sold. It will perform double all the most wonderful stunts. 25c postpaid. Stamps accepted.

JOHNSON SMITH & CO.

$1.50 ROLMONICA

A Mouth Organ that Plays with a Music Roll

Any One Can Play It Without Practice

A Wide Selection of Rolls to Choose From

A Veritable Pocket Size Jazz-Band!

All the latest Broadway Hits

The Pocket Player Piano

Rolmonica is an automatic harmonion, that plays a music roll just like a player piano. It is a mouth organ blend and in one—it brings a number of the musical world in the last few years. Anyone can play it, for all you have to do is to insert a roll, and turn the crank, and the music is there in full. Nothing could be simpler. Each roll is perforated with two simple tunes can play the Rolmonica. It is a veritable pocket-size Jazz-Band. Rolmonica is a combination of the Mouth Organ and Player Piano. It is composed of a hundred reeds, played by the proper combination of holes in the music roll. There are hundreds of rolls to select from, such as My Blue Heaven, Some Sweet Lovin' Man, Oh! Black Eyed Susie, Sailing, Sailing Over the Bounding Main, Hometowns, Wild Irish Rose, Roses Of Picardy, Among My Souvenirs, Love's Old Sweet Song, Tiptoe Thru' The Tulips Lady, Alaska Or, Bacarola, Juanita, Rose Marie, Dreamy Melody, Sunbeam Waltz, Daddy of My Dreams, Carolina Moon, I Faw Down & Go Boom, Sonny Boy, Ja, Da, Over There, Ma Curley, Long Way to Tipperary, Make Believe, Desert Song, In the Twilight, Sweet Adaline, Pen Gen a Feeling, Pagan Love Song, When My Dream Comes True, Sweet Genevieve, Sweet Lucille, Yankee Doodle Dandy, Yankee Doodle Boy, Hail the Conquering Hero Comes, Auld Lang Syne, Andante Cantabile. An unfailing source of amusement. You can delight in playing it, or can play it for your friends and entertain by showing rolls. Small in size, fitting easily into the hands of the child or grown-up. Simplifying tune-power. Not a toy, but a genuine musical instrument and the life of any party. One Roll free with each Rolmonica. Extra Rolls always obtainable, complete list with each instrument. New Rolls added each month. PRICE with 1 Roll $1.50; Extra Rolls 10c each, all postpaid.

Send remittance (Postage Stamps accepted) for all articles listed above, also in our other ad on previous page

JOHNSON SMITH & CO. Dept. 554 Racine, Wis.

MAGICIAN'S BOOK OF TRICKS

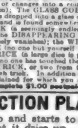
Apparatus and Directions for a Number of Mysterious Tricks, Enough for an Entire Evening's Entertainment.....$1.00

ANYONE CAN DO THEM

It is great fun mystifying your friends with the Card Box. Get the Conjurer's Cabinet, and you will be the nervous follow in your dances. In combine the apparatus for ten first-class tricks, including The MAGIC BALL AND VASE TRICK, in wooden ball is placed inside, and upon replacing the lid the flumpenard and is found in someone else's pocket; The HINDOO CHOPPING BOWL TRICK, in which a handful of rice changes to two live rabbits; DISAPPEARING COIN BOX is coin, placed in the wooden box, vanishes entirely or appears in the hand of another denomination); The GLASS GOBLET TRICK, in coin is dropped in a glass of water and when the water is poured out the coin has vanished and is found somewhere else); the RIBBON FACTORY FROM FIRE MISTER TRICK, in which seemingly endless length of ribbon is drawn (apparently out of your mouth); the DISAPPEARING HANDKERCHIEF is handkerchief first shown and then mysteriously disappears; the WIZARD'S RING COIN TRICK draws the CHANGING RIBBON TRICK, in one but yourself is able to make it lay down; the GREAT HAT AND DICE TRICK, in which dice are found in a hat that has been previously turned inside out and shown to be empty and the PHANTOM CARD TRICK, or two from five leaves nothing. Full instructions are given for performing each trick. In addition to the above, a number of other tricks and illusions are fully explained for which you can easily make or procure the necessary apparatus. Price complete $1.00 postpaid. Stamps taken.

RESURRECTION PLANT

Great curiosity. Place in water, plant opens up and starts to grow in few minutes. Taken out of water it closes up and goes to sleep until put in water again. PRICE 10c, 3 for 25c. 7 for one dozen, postpaid



MADE? **MAGIC TRICKS**

10c

As excellent little book containing 250 Parlor Tricks, Tricks with cards, coins, handkerchiefs, etc. Tricks that require no apparatus. Tricks that anyone can perform at any time. Good for many hours entertainment. Sent postpaid to any address for only 10c. 3 copies for 25c.

Comical Motto Rings

Lots of harmless fun and amusement wearing these rings. Made in gilt-plated finish (to resemble platinum), with engraving on the shield, as illustrated. Price only 25c Postpaid.

The "Little Giant" Typewriter

A First Class Writing Machine for $1.50

A perfect little typewriter for $1.50. We are thousands of people who would like to see a typewriter but have not room and money to buy a machine, anyone attached to the postoffice and use of a typewriter and roller measure. In such persons we confidently recommend our Little Giant. It is strongly made, but simple in construction, so that anyone can quickly learn to operate it and write a letter in a few minutes. It has a complete set of the alphabet

most frequently used are so grouped as to enable one to write rapidly, the outward stroke of the type bars printing the letters and the inward stroke bringing the paper to the next space. This machine you can carry in your best girl typewriters love letters, address envelopes, make out bills, and do almost any kind of work not requiring a large, expensive machine. With each typewriter we send a nine-inch and full printed instructions for using the machine. Price complete $1.50 by mail postpaid to any address in the world. Stamps accepted

Send Only 10c. for Complete Bird House Plans

The Stanley Plan No. 9c gives you step by step instructions on how to make three attractive bird houses.

Anyone with a few good tools can make them. Send 10¢ for Plan No. 9c and list of twenty-four other plans from which you can select the ones that interest you.

THE STANLEY RULE & LEVEL PLANT
New Britain, Conn.

STANLEY TOOLS
The kind most carpenters use

COMPLETE PLANS ONLY 10 cents

WANTED MEN

To Manufacture Metal Toys and Novelties

Big demand for 5 and 10c Store Novelties, Ashtrays, Toy Soldiers, Animals, Auto Radiator Ornaments, etc. We co operate in selling goods you make; also buy these from you. Small investment needed to start and we help you build up. WE FURNISH COMPLETE OUTFIT and start you in well paying business. Absolutely NO EXPERIENCE and no special place needed. A chance of a life time for man with small capital. Write AT ONCE if you mean strictly business and want to handle wholesale orders now being placed.

Metal Cast Products Company
Dept. 2 1696 Boston Road New York City

Car Washing now a PLEASURE!

With this Amazing NEW Invention!

Simply attach a Gy-Ro Brush to an ordinary garden hose. Turn on the water. Then proceed to brush down the car with Gy-Ro as casually as though you were whisking away a fly! You will marvel that such wonders could be accomplished without the use of chamois or auto soap. Now, CAR WASHING IS ACTUALLY A PLEASURE!

GYRO WHIRLO BRUSH washes CARS CLEAN! Gy-Ro corks by Harnessed Water Power. A powerful torrent of water revolves the inside brush at a speed of 1,000 revolutions per minute. This speeding center removes all mud and dirt. Gy-ro gives the cleanest, fastest car wash ever—yet it cannot harm the finest car finish.

Rush Coupon for FREE OFFER
Don't wait another minute! Get your share of the big money that is being made with Gy-RO. Quick action means quick money in your pocket. ACT NOW!

AGENTS WANTED

Live agents are needed everywhere to demonstrate this amazing invention, needed by auto owners, garages, service stations everywhere. 100% profit for spare or full time workers.

ACT NOW

MAIL THIS Coupon TODAY

GY-RO BRUSH COMPANY,
Dept. D-18, Bloomfield, N. J.

Reserve territory for me. Please send me at once, without obligation, full facts about salesmen's proposition.

Name .....

Address .....

Town ..... State .....

Cheating Players at Carnival Games

(Continued from page 114)

is pulled back all the way, revealing the complete figure, which is usually valueless.

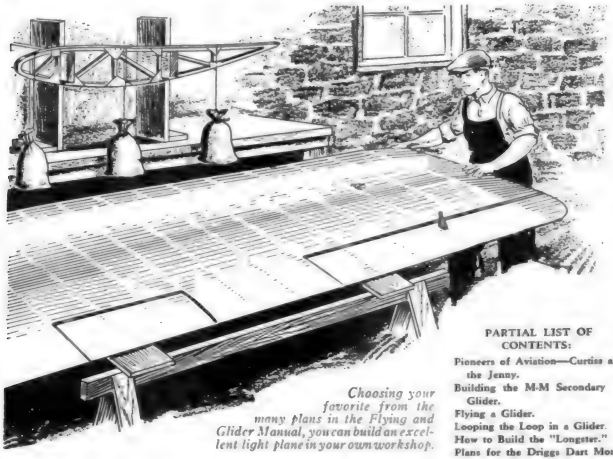
Even the lowly shooting gallery has come in for its share of tricks. The guns used in this type of concession are, as a rule, ordinary air rifles, using projectiles made of cork. All the operator has to do to see that a customer does not win is to "gaff" the cork. This is accomplished by nicking it with the fingernail, as illustrated in Fig. 2 at the top of page 114. Another method is to place the cork in the barrel at an angle. In either case the gun fires inaccurately, so that the player misses the target.

To cheat the customers the operator often tampers with the targets. Fig. 5 shows how a coin can be arranged so that it will remain upright when struck. Unless hit square in the center, it will merely pivot around on the nail which projects up into the cork mounting. Another trick is to weight the bottom of a cigarette package with a coin so that it cannot be shot off the shelf, but will merely fall down, as shown in Figs. 3 and 4.

To run the "Roll Down" game profitably the operator must be a lightning calculator. His game consists of a flat board with holes, numbered as illustrated in the accompanying drawing. The player is allowed to roll five balls, which stop in five holes that are added up to give the score. The winning scores are usually a series of high or low numbers. The numbers of the holes are so arranged, however, that the operator, when rapidly counting up the score, can point to a high or low number, about the hole, and thus have his total come out any number he wants. This number, of course, will not win a prize.

The "Watch-La" game is somewhat similar to the "Hoop-La," or "Pitch Till You Win." In this game, though, blocks which are almost square and which lie flat on the table are used instead of pegs. The block, on which is placed the prize, is somewhat irregular in shape, but its dimensions are such that the ring could not possibly fall over it when pitched from the front. This is illustrated in the accompanying drawing. In demonstrating the trick, however, the operator merely has to pass the hoop over rapidly from the rear. The hoop goes over easily, but the player is unaware of the fraud.

Build YOUR OWN Airplane!



Choosing your favorite from the many plans in the Flying and Glider Manual, you can build an excellent light plane in your own workshop.

PARTIAL LIST OF CONTENTS:

- Pioneers of Aviation—Curtiss and the Jenny.
- Building the M-M Secondary Glider.
- Flying a Glider.
- Looping the Loop in a Glider.
- How to Build the "Longster."
- Plans for the Driggs Dart Monoplane.
- The Church Mid-Wing Sport Monoplane.
- Design of the Georgias Special.
- The Heath Seaplane and Its Pontoons.
- Flying Your Own Plane.
- The O H Conversion Glider Motor.
- Rebuilding the Lawrence Engine.
- Building the Rabl Radio.
- Model Plane Drops 'Chute.
- A Flying Model Sailplane, and scores of others.

YOU can build a reliable, flyable light airplane for yourself and you don't have to be a skilled aeronautical engineer to do it, either. All you need are a few tools, the necessary materials, and you can start right in to construct that dream ship of yours, choosing one of the complete plans which appear in the 1931 Edition of the

FLYING AND GLIDER MANUAL

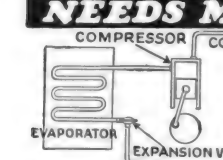
All the plans for airplanes and gliders in this great how-to-build-it book are presented with elaborate working drawings containing necessary dimensions and information, together with photographs which show clearly every detail of construction. Everything explained in easy, understandable step-by-step fashion. Examine a copy at your nearest newsstand and see for yourself how it simplifies the task of building an airplane!

PRICE 50 CENTS . . NOW ON SALE

Look for This Cover

If your newsdealer is sold out, send 50 cents to Fawcett Publications, Inc., 529 South Seventh St., Minneapolis, Minn., and a copy of the 1931 Flying and Glider Manual will be sent you at once.

NEW INDUSTRY NEEDS MEN

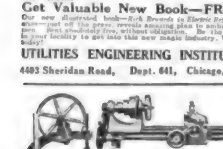


ELECTRIC REFRIGERATION Calls You! Newest American Industry needs men for $200 to $1,000 a month jobs in production service, installation and sales. Fastest growing, money-making field—founded by General Motors, General Electric, etc. New easy home training qualifies you for big pay job. This training endorsed by Servel, Kelvinator, Copeland and other large manufacturers.

Get Valuable New Book—FREE

Our new illustrated book—*Rich Rewards in Electric Refrigeration*—is part of the most amazing plan to assist home men. Best absolutely free, without obligation, this book tells the full story. Send today! Write today!

UTILITIES ENGINEERING INSTITUTE
4403 Sheridan Road, Dept. 641, Chicago, Ill.



THREAD CUTTING LATHE
A REAL LATHE. 9" swing 20" between centers. Special attachments and tools available. 12" Band Saw Powerful, practical. Not a toy. Has tilting table. Price only **$30**
Write for Catalogue and Prices on these and other machines.
1516B. Fernwood Ave., Rossbacher Machine Co., Toledo, Ohio.

34 Lesson Drawing Course $2.98

The biggest value you ever saw advertised anywhere . . . . . .

Haven't you often wished that you could draw cartoons, illustrate some idea, sketch some pretty face, etc.? You can do all of these things. One of America's most famous Cartoonists and Illustrators has developed a great, simple system for success in all branches of Commercial Art. This system has revolutionized the entire theory of drawing. It means that drawing can be as easy for you as writing—much simpler than learning shorthand, bookkeeping or typewriting. We are now placing this original system for learning Drawing, Art and Cartooning, consisting of 34 lessons with over 500 illustrations, within reach of every one. If you will devote a few hours each week to the Course WE ABSOLUTELY GUARANTEE that you will learn to draw and draw well before you have half finished the Course. If we fail to make this claim good, we will refund every cent paid us. By eliminating a large office force for answering correspondence, expensive catalogs, etc., we are enabled to make a price of $2.98, the cheapest price ever known for a high-grade, home study course. Learn to draw. It is a big asset, no matter what field you are in.

SEND NO MONEY

Just order the course and **$2.98** on arrival pay postman plus a few cents postage, payment in full for the entire Course and Drawing Outfit. If not entirely satisfied, return within five days and we will Refund Money. Address:

LEDERER SCHOOL of DRAWING.
Dept. 9000-E Chattanooga, Tenn.

Orders from outside the U. S. A. are payable $3.20 cash with order.

If you order the Course at once, we will include a Drawing outfit, consisting of artists' pencils, pens, paper, erasers, thumb tacks, etc., enabling you to go to work without any additional cost.

Measuring Mountains of the Sea

(Continued from page 91)

All this may sound simple but it is anything but that.

Oftentimes an extremely strange incident turns up in connection with this method of mapping the ocean's floor.

In one case one of Uncle Sam's "Ocean surveyors" attached a hollow glass ball to a sounding wire and sent it down some 3,000 fathoms. When it came up again the ball was half filled with sea water. A round hollow object like that is hard to crush, so that the result was that the tremendous pressure conditions down below—about 36 tons to the square inch—forced the sea water to penetrate clear through the pores in the glass.

Although the wire sounding system is still used extensively, Uncle Sam's experts are inclined to favor two more modern and efficient devices of the "echo-sounding" type known as the "fathometer" and the "sonic depth finder". With both systems an "oscillator" or electrically actuated drum sends out a sound wave which travels to the ocean's bottom, and is then reflected upwards and caught by a hydrophone, or sensitive electric ear, which transmits an electric impulse to the measuring and recording apparatus on the bridge of the surveying vessel.

When the fathometer is used in this connection the incoming sound echo from the bottom of the sea flashes a neon tube on a revolving plate, the position of the flash indicating the depth. Sound travels at the rate of about 800 fathoms a second, so that if a ship is in 800 fathoms of water, it would take only two seconds for the echo to return. And if the vessel is riding over a depth of 2,400 fathoms it would take only six seconds until the echo returned from its almost 5 miles of travel to the bottom and back!

By means of the sonic depth finder you need only to adjust a little gadget until the outgoing sound wave and the incoming sound are in synchronism. This gives you a reading and you enter that reading in a table which immediately gives you the depth. In such fashion you can measure the time to within less than a hundredth of a second

In other words, without reducing the speed of the vessel, it is possible, by means of these modern echo-sounding devices, for the mariner and navigator to maintain a continuous record of the depths, whether shallow or deep, over which he is passing.

For Men who have home workshops...

YOU'VE been looking for a book like HOW TO BUILD IT, the Home Craftsman's Manual—chuck full of remarkable plans for building things in your home shop — profusely illustrated with photographs, dimensioned working drawings, everything presented in picture form and accompanied by non-technical descriptions. Here's a sample of what you'll find: Plans for a 15-Foot Sailboat; Log Cabins; Lawrence Water Glider; Electric Auto; Ozone Generator; Marionette Show; Flash Steam Engine; Radio-Controlled Model Battleship; Canvas Canoe—and hundreds of others.

LOOK for This Cover: Now on Sale

Price 50 Cents on all News Stands

If your newsdealer is sold out, send 50 cents to Fawcett Publications, Inc., Minneapolis, Minn., and a copy of How-to-Build-It will be sent you at once.

NEW "STICKTITE" Just Stick It On! COAT HANGER

Place 20 Display Cards On Store Counters and Collect Up to

$20 A DAY PROFITS

BIG STEADY REPEATS

Here is a chance to get into a big steady repeat business of your own overnight and make up to $20 a day—yes, $140 a week clear profit. That's what you can any time you can say by simply placing these astounding new automatic salesmen of newly patented Sticktite Suction Grip Coat Hangers. Harvesspace and add comfort. Hold hats, coats, handbags conveniently out of the way. Every home, automobile can use several. Made of Bakelite in a variety of beautiful color and modelled effects. The hanger is highly nickel polished. Sells on sight the moment you show it and notice it retails for only 25c. You make 100% profit selling to dealers and 25% profit selling to consumers on full or spare time.

In Assorted Colors BAKELITE with Invisible Suction Grip Attachment

For Auto, Home, Office

IT SELLS EVERYWHERE—IT'S NEW!

Every man and woman, every car owner and every dealer buys on sight. You can place the Sticktite display with automobile and auto accessory dealers, drug stores, hardware stores, novelty shops, cigar stores, men's furnishing stores—hundreds of different places where dealers are glad to accept your unusual offer.

A Lifetime Opportunity With This Automatic Profit Maker

Our amazing selling plans show you many ways of making big money selling to dealers outright or on consignment. You can easily place 20 cards with dealers every day—60 cards every three days. Your cost in lots of 60 is only $3.00 per card. Sells to dealers at $2.60 per card—you make 100% profit or $20.00 a day, and just think of the tremendous repeat business that you are building.

Packed in assorted colors. 13 to each Display Card

Get Started At Once In This Big Paying Business. $1.50 Investment Pays You $1.75 Clear Profit

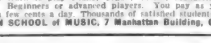
Send 25c for sample Sticktite or $1.50 for sample card of 13 Sticktites. You make $1.75 clear profit selling to consumers or use card to take orders from dealers.

I Guarantee You Sales —You Can't Lose!

I guarantee that you will sell these Sticktite Coat Hangers or refund your money absolutely. You will receive full details and selling plans with your order for single sample or display card of 13. Act at once and reserve your territory.

MASTERLITE MFG. CO.
Dept. CD-17
110 E. 23rd St., New York, N. Y.

MUSIC LESSONS IN YOUR HOME



You can play music like this quickly.

Write today for our FREE BOOKLET AND SAMPLE LESSON. It tells how to learn to play Piano, Organ, Violin, Mandolin, Guitar, Banjo, etc. Beginners or advanced players. You pay as you learn. Costs only a few cents a day. Thousands of satisfied students.
AMERICAN SCHOOL of MUSIC, 7 Manhattan Building, CHICAGO

Good and Good for You.

NEW PAINT DISCOVERY

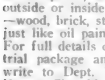
PAYS AGENTS UP TO $90.00 A WEEK

Paint WITHOUT OIL Saves Paint Users 75%

Free Sample Sent!

A remarkable new kind of paint is being offered by a prominent Kansas City Paint Manufacturer that actually cuts the cost of paint 75%, and enables agents to make tremendous earnings merely showing "easy to carry samples," and taking orders. It comes in the form of a dry powder, and requires only cold water added to make a paint that is weatherproof, fireproof, durable and sanitary for outside or inside painting. Used for any surface —wood, brick, stucco or stone—spreads and looks just like oil paint—at about one-fourth the price. For full details of this amazing discovery, FREE trial package and BIG MONEY making offer, write to Dept. 16, Farm and Home Paint Co., Kansas City, Mo.—Adv.

Sport Bodies for Fords At Factory Prices



This Model in Grey Prime $38.50

Send 10c for catalog showing all models of bodies and other equipment for Ford and Chevrolet. Hi-compression heads, underslung parts, 3:1 gears, headlights, fenders. Quick-on body on Model A Ford. Also made for Model T Ford.

Make Your Ford Into Classy Car

Sport Factories, Dept. S-5, Aurora, Illinois

A Career in Aviation

AVIATION is the great career of the future! Get into it now by practical, posted routes—study International Correspondence Schools Courses in Aviation Engines and Ocean Navigation!

Captain Lewis A. Yancey, hero of the recent New York-Bermuda flight, says: "The I. C. S. books on Navigation are about as fine as have ever been prepared on the subject, and are to be highly recommended to the aviator who is desirous of learning the navigational side of his calling."

The Aviation Engines Course includes necessary study of Mathematics, Mechanical Principles, Combustion and Fuels, Principles of Gas Engines, Construction, Carburetion, Ignition, Lubrication and Cooling, Pumps, Propellers, etc. You can start at once. Study at home in spare time. Mark and mail the coupon today!

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Fastest University"
Box 2317-K, Scranton, Penna.

Without cost or obligation on my part, tell me how I can qualify for the position or in the subject before which I have marked X:

☐ AVIATION ENGINES ☐ OCEAN NAVIGATION
☐ DEAD RECKONING

Name .....

Street Address .....

City ..... State .....

Outwitting the Plant Smugglers

(Continued from page 148)

filled with alligator pears. Now, these delicacies are likely to contain an unwanted kind of pest. This "inventor" extraordinary was tried, found guilty, and given a stiff fine for his ambitious efforts to pull a fast one on your Uncle Samuel.

A somewhat similar incident, but of a far more serious nature, took place on the border near El Paso recently. A very dignified gentleman of middle age who claimed to be some sort of a scientist presented his trunk for Federal inspection. Nothing contraband seemed to be on hand until one of the inspectors nonchalantly plunged a hand into a bulky looking pile of the man's coats and trousers. Encountering numerous hard objects, the inspector made a thorough investigation and found no less than 56 contraband orchid plants. That the offender's intentions were anything but innocent was revealed by the fact that every one of the plants had been sewed painstakingly into the garments with an obvious intent to deceive. Imagine Mr. Scientist's embarrassment when he saw his well worked plans go awry, even to the point of earning a substantial fine.

Then there was the case of the American woman who crossed the Mexican border into the United States wearing an extremely full skirt of a type common to certain well known religious sects. Devout looking was this lady, yet there was a certain something about her demeanor that aroused suspicion, so a lady inspector was instructed to give her a thorough inspection. This brought out the interesting fact that the good woman had tied a huge bag, filled with contraband fruit, around her waist. Which may explain why she chose such full skirts on that eventful day.

But for sheer ingenuity, consider a package lately received by postal inspectors. At first glance it consisted of a number of heavy magazines. But their weight was so out of proportion to their size that the inspector opened the "magazines". Whereupon he found many bunches of contraband nursery stock, alongside of which a couple of potatoes had been packed in order to afford moisture to the stock.

Other clever ruses of the smugglers are: false bottomed trunks and barrels, besides contraband fruits and plants which have been hidden in partially baked loaves of bread.

Why they die young . . . .

telling why so many film stars die in their prime. "The Famous Name Menace" by Doug Fairbanks, Jr., "The High Cost of Divorce in Hollywood" . . . sparkling personality stories on Joe E. Brown, Evelyn Brent, Mary Brian, Wallace Beery, Joan Bennett and others . . . Funny Films Contest with $500 offered in cash prizes . . . all this and more in—

APRIL

If your newsdealer is sold out, send 25 cents to SCREEN PLAY Magazine, Fawcett Publications, Inc., 529 So. 7th St., Minneapolis, Minn., and a copy of the April issue will be mailed to you. Better still, subscribe to SCREEN PLAY. See wonderful free offer below.

Screen Play

A FAWCETT PUBLICATION

On Sale March 5

REMEMBER! With your copy of April SCREEN PLAY you will receive an exquisite, large, autographed portrait of the screen's newest sensation, MARLENE DIETRICH, to add to your collection.

FREE !

With every yearly subscription to SCREEN PLAY a copy of the MOVIE ALBUM, a 116-page book containing complete biographies and beautiful full-page portraits of all the stars, which sells for 25 per copy, will be given absolutely free. Send $2.50 to Fawcett Publications, Inc., 529 So. 7th St., Minneapolis, Minn., for a year's subscription to SCREEN PLAY and the MOVIE ALBUM will be mailed to you at once.

NO JOKE TO BE DEAF

—EVERY DEAF PERSON KNOWS THAT

George P. Way made himself hear, after being deaf for 25 years, with Artificial Ear Drums —his own invention. He wore them day and night. They stopped head noises and ringing ears. They are invisible and perfectly comfortable. No one sees them. Write for his true story, "How I Got Deaf and Made Myself Hear." Also booklet on Deafness. Address GEO. P. WAY, Inc., 1064 Hofmann Building, Detroit, Michigan

Artificial Ear Drum

ELECTRIC FUN!

200 Stunts with 110 Volts, $1.00
CUTTING SONS, Bldg. 2, CAMPBELL, CALIF.

WHY STAMMER?

Don't be a failure. Master perfect speech. Live a healthy, normal and happy life. Send for free book which tells you how.
THE LEWIS INSTITUTE, 12958 Woodward Ave., Detroit, Mich.

ENGINE CASTINGS

and Detailed Drawings for Power Models, Air or Water Cooled, 1¼" Bore and Stroke.

Send 10c coin for circular about "Wall Castings."

ELMER WALL
5900 N. Fairfield Ave., Chicago, Ill.

Training in all branches of AVIATION

From a 21-year-old Recognized School.

Standard Aviation Instruction, at home, by experienced Aviation experts—Aircraft Drafting, Repair, Aeronautical Engineering, Welding, Blue Print Reading, Meterology, Aviation Law, Aerodynamics, and all other courses necessary for success in Aviation. Rush coupon for further information and free booklet, "WHY DO AIRPLANES FLY". No obligation. Courses approved by Aviation authorities. Active employment service.

COLUMBIA "TECH"

Local and Correspondence instruction in All Branches of AVIATION — DRAFTING — ENGINEERING
1319 F St. N. W., Washington, D. C.

Send me copy of your Free Book showing how I can get into Aviation and copy of "WHY DO AIRPLANES FLY."

Name ..... Age .....

Address M.M.4-31

Send for this Book—Now! It's real fun to build things, make models, fix furniture, or do ANY wood-working job, when you know the EASY ways to cut and fit 24 types of joints, shown in this book. Diagrams, photos and clear instructions will soon teach you to do home carpentry like an expert.

A Home Workshop Manual

It is amazing how much practical information is packed into 32 pages! Tells how to plan a home work-shop . . . gives lists of tools for a small, medium or large shop . . . suggests suitable bench machines . . . shows how to build work-benches, saw-horses, tool box and wall cabinet.

Also, tells where to obtain job plans to build 200 things for home, lawn, garden, sports, farm, etc. Book costs a dime; worth dollars to every tool user-around or old, around or expert. Just send 10c to E. C. ATKINS and Company, 419 S. Illinois St., Indianapolis, Ind. ("The Silver Steel Saw People.")

New Complete "Wonder" Workshop
$18.30 Without Motor **BUY DIRECT** **Save 35% to 60%**

	Plain	Arranged for Motor Drive
12-in. Band Saw	$24.75	$31.35
11-in. Lathe	21.00	29.25
4 to 36-in. Scroll Bar	4.80	13.44
6-in. B. B. Jointer	44.00	54.00

3-PIECE WORKSHOP
Three-speed Lathe, 7-inch Saw Table, 8-inch Scroll Saw $54.00
All Without Motors. Write for Circulars!
S. & B. MFG. CO., Dept. MM-4, 4407 W. 20th St., CHICAGO, ILL.

"Pick YOUR GovernmentJob"

—I'll show you the quickest way to get on Uncle Sam's payroll. Get my free book—tells about all jobs—pick the one you want—ask me how to get it.

THE best and steadiest trade of all is a job with Uncle Sam. No worry, no lay-offs, good pay, regular increases, vacations with pay, time out with pay when sick, a pension when you retire. YOU can get one of these jobs. I'll show you how. Send for a free copy of my new book. Then pick the job you want. Some are right in your own town, others take you all over the country. And the pay is good. Railway Postal Clerks, for instance, receive an average yearly pay, with allowances, of $2759.00. My book tells about this and many other jobs. Forget "job-hunting." Work for Uncle Sam. Mail the coupon for a free copy of my 32-page illustrated book. The quicker you act the sooner you can start. IMPORTANT. Railway Postal Clerk examination coming, so be prepared. Address me personally—Arthur Patterson, *Former Civil Service Examiner*, PATTERSON SCHOOL, 204 Wisner Bldg., Rochester, N. Y.

A. R. Patterson, Civil Service Expert,
PATTERSON SCHOOL, 204 Wisner Bldg., Rochester, N. Y.

Send me your Big FREE BOOK telling how I can secure a position with the U. S. Government paying from $1,800 to $3,000 a year to start, with excellent chance for advancement. This doesn't cost me a penny.

Name .....

Address .....

How to Build "Gannet"

(Continued from page 138)

heads of the screws. Give the back of the moulding a good coat of paint before you put it on.

About this time you can make and put on the guard. This ought to be of the best oak you can get—good, close grained, hard, tough stuff. The top is to be flush with the top of the planksheer and to carry out the curve of the deck. The outer face is to be a little deeper than the iron on it. Be sure to give the back of it two good coats of paint before you put it on or you'll have black streaks down the boat's side and have to take the guard off and paint it. Do it now and save yourself trouble. Better use galvanized iron on the face of the guard. Half oval is the first choice, half round next and flat last.

Now fit the filler for the cockpit coaming. This fays against the clamp and the inner face should be beveled so that the coaming will have the same tumble home as the side of the house. Fasten it to deck and clamp and then get out the coaming. The outside fairs into the side of the house and the top has a sweep, the after end being finished with an ogee. Fit plugs over the fastenings.

The Cabin Floor

The cabin floor rests on the floor timbers (the bottom parts of the frames). It is flat except forward where one plank on each side has a lift to it. Leave a plank loose down the center line so that you can get it up easily if you ever want to get at the bilge. You will then lay the cockpit beams, landing their ends on a stringer fastened to the inside of the frames. The cockpit floor may be built of tongued and grooved stuff, nailed to the beams, and then covered with canvas laid in marine glue or thick wet paint. Turn up the edges outboard and cover with a strip of hard wood. Then fit the ceiling along the side frames. This may be either beaded or plain but should be tongued and grooved. Leave about ½" or more between the top of the ceiling and the bottom of the clamp so the bilge will have a little ventilation.

The seat across the after end of the cockpit may next be fitted. Have a cushion rail along the front of it to keep the cushion from sliding off. The top of this strip should be rounded. Make the lazy back with a good deal of care. The sides should fit neatly and, above the bottom of the filler under the deck, should be at just the correct angle to brace

the coaming. The top is rounded off as shown. Get the rake of it right, too, so that it will be comfortable.

Remember that the toilet forward needs two sea cocks on the hull, one for the discharge and one for the intake. Buy these from a marine supply house or order them when you order the toilet. This is about the smallest marine toilet made. Fit the sea cocks, then install the toilet and connect with lead pipe. Do not use hose for this but have a good plumber do the job for you if you are not sure that you can do it yourself successfully.

Placing the Bunks

Now comes the cabin joiner work, which will give you a chance for some ingenuity. The bunks each side are about as wide as can go in. Don't make them any higher for you want plenty of sitting height. The sink and dresser are on the starboard with a locker below the dresser for food, pots, etc. On the port side is the ice box, built as shown, with a place for the stove on top of it. It may be well to insulate the woodwork around the stove with sheet zinc and asbestos. Make a good job of the ice box, with tight joints and everything well painted. Abaft the ice box are some shelves for pots and pans, or these may be fitted to take the dishes. Pegs set at an angle in the after bulkhead will serve to support the glasses, and hooks on the carlines the cups. You may find that you can work in little shelves elsewhere. Some of these you may not install until after you have made a cruise or two and find just what is needed.

The tanks should go in about now, one for water and one for gasoline. The water tank is placed forward and the gasoline tank aft. Hang them from the deck beams and brace them so that they can shift neither fore and aft nor sidewise. Fit the filling pipes to the deck, with a screw plate over each and have the gasoline fill pipe tight at the floor. Fit a vent pipe to each, taking the vent from the gasoline out through the transom. Pipe from the gas tank to the carburetor. Pipe from the water tank to the sink and fit a small hand pump to draw from the tank. The discharge from the sink leads overboard just below the painted waterline.

Gannet's awning frame is shown made up of pipe and fittings, galvanized, of course—but you can build it out of hardwood if you

(Continued on page 198)

GET INTO HIGHER ACCOUNTING and HIGHER PAY

Of course you want the bigger pay that goes with a bigger job—but if you're like most men you're wondering right now how you can get it. *Hundreds of thousands of men have found the answer!* Take the experience of any one of them—Vance Anderson, for instance.

For many years Anderson groped blindly for success. He tried farming—running a truck-line—then the study of mechanical engineering, then accounting at a resident school. Dissatisfied with that, he enrolled for LaSalle's course in Higher Accounting. From that time on his future assumed a definite form.

VICE-PRESIDENT—by the time he had completed LaSalle Training

While still studying, he became Office Manager of the Central Indiana Canneries, then joined the Olin Chevrolet Company of Indianapolis, one of the large automobile agencies of the Middle West. And before he completed the course he was made Vice-President! During that time his salary increased several times over! Is it any wonder he says, "*Real study with you will pay any man.*"

Knowledge of Higher Accounting leads the way to so many business opportunities that the well-trained man is practically proof against unemployment. A dozen doors are open to him while the untrained man is walking the street. Advancement is swift and certain—for the very foundation of business lies in accounting control. That is why LaSalle graduates in Higher Accounting occupy some of the highest executive positions.

LaSalle has made it easy for you to master this big-pay work in spare time study at home—no matter what your previous education or experience. This is backed by a placement, consultation and advancement service that follows throughout life.

Send for "Ten Years' Promotion in One"—the little book that hasled to lasting hundreds of millions of dollars to the annual salaries of 700,000 men. With it we will include full information about the big-opportunity field of Higher Accounting. Sending the coupon below may be the turning point in your life. Don't delay, but send it today—NOW!

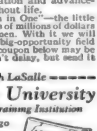
Find Yourself Through LaSalle

LaSalle Extension University

The World's Largest Business Training Institution

Dept. 4493-HR Chicago

I would welcome copy of "Accountancy, the Profession that Pays," also a copy of "Ten Years' Promotion in One," all without obligation.



○ **Higher Accountancy**

Training for positions as Auditor, Comptroller, Certified Public Accountant, Cost Accountant, etc.

Other LaSalle Opportunities

If more interested in one of the fields indicated below, check and mail now.

○ Business Management	○ Banking and Finance
○ Modern Salesmanship	○ Modern Business Correspondence
○ Traffic Management	○ Railway Accounting
○ Railway Station Mgmt.	○ Expert Bookkeeping
○ Law: Degree of LL.B.	○ C. P. A. Coaching
○ Commercial Law	○ Business English
○ Industrial Management	○ Commercial Spanish
○ Modern Foremanship	○ Effective Speaking
○ Personnel Management	○ Credit and Collection Correspondence

Name.....

Present Position.....

Address.....

10 First Prizes of $700.00 Each!

CAN YOU FIND THE TWINS?

Here are shown poses of Walt Disney's Mickey Mouse who has soared to "movie" fame in Columbia Pictures. He is ready to help you find success through a real test of observation that will qualify you for the opportunity to win fame and fortune for yourself and win one of the ten First Prizes in our sensational publicity offer.

Some of Mickey's poses may appear to be alike, or none of them may look alike to you —at first. But there are two alike — identical twins— where Mickey Mouse's arms, feet, head, etc., are in the same position.

Look carefully. When you think you've found the twins, send their numbers on a card or mark with an "X" and send by letter. But be quick.

10 EXTRA PRIZES OF $100.00 Each For Promptness

will be paid to the Ten First Prize Winners on the proof of promptness, making each of the ten First Prizes $700.00 cash, or, if you prefer, a new fully equipped 1931 Chevrolet 2-door Sedan (value $600.00) and $100.00 extra. Duplicate prizes in case of ties. No answers accepted from persons living outside U. S. A. or in Chicago. Send no money. No obligation. Just rush your answer today, and I'll let you know at once if it is correct.

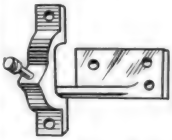
W. C. DILBERG,
Publicity Director,
502 N. Dearborn Street, Room 189,
Chicago, Ill.

Talkie and Movie Producers are clamoring for new short story ideas, plots, etc. Perhaps you can write one that we can shape and sell for you. One writer (V. M.) received $3000. New York best market. Write for full particulars.
DANIEL O'MALLEY CO., Suite 9, 1776 Broadway, New York

How to Build "Gannet"

(Continued from page 197)

don't want to bother with pipe fitting. If so, run a stout strip fore and aft on each side and fit a few light carlines athwartships. Then run light slats fore and aft on top of these to support the canvas. Have the top crown so that rainwater will run off and not collect in one vast puddle. Get waterproof canvas if you can, for plain canvas will mildew before long. Have it a light khaki color as white is hard on the eyes. Squiffy big yachts have double awnings, white on top and blue underneath, but that would hardly work on a little hooker like *Gannet*.

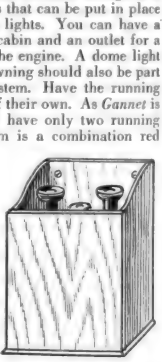


Hinge for jump rail sash. They are made right and left.

Fit a bilge pump in one corner of the cockpit with the suction pipe leading to the lowest part of the bilge and with a good strainer on the end of it. (Be sure that you clean out every scrap of shavings, sawdust and rubbish of all kinds before you leave the dock.)

There are a number of small fittings such as chocks and cleats that can be put in place now as well as the lights. You can have a light or two in the cabin and an outlet for a trouble light near the engine. A dome light under the cockpit awning should also be part of the electrical system. Have the running lights on a circuit of their own. As *Gannet* is in Class I, she will have only two running lights. One of them is a combination red and green and is on the forward end of the house. The other is a white one and is on top of the awning. This may be used as an anchor light when the other is switched off. Be sure that all fittings in the light circuit are waterproof.

A pair of chocks is fitted in the rail



A box for the binoculars is a handy thing.

(Continued on page 200)

Win $2,500 Or Buick Sedan and $1,000

You can share in great advertising campaign. Over $5,000.00 in 140 Prizes. Also thousands of dollars in special rewards. C. H. Essig, a farmer, Argos, Ind. won $3,500; Mrs. Edna Ziler of Kentucky, won $1,950; and scores of others. Now better than ever. This is your opportunity. In our new campaign **someone** wins $2,500—**why not you?** Enter now—

CAN YOU FIND 5 FACES?

Strange faces are in tree, clouds etc. Some are upside down, others look straight at you. **If you find 5 or more faces,** mark them, clip the picture and mail. If you answer now, and take an active part, **you are sure to get a special cash reward.** You may win Buick Sedan, and $1,000 for promptness—or $2,500 if you prefer all cash. Mail answer today.

$1,000 Extra for Promptness
If you are prompt I'll give $1,000 extra if you win first prize. Answer today!

Send Today Someone answering wins Buick Sedan delivered by nearest dealer. Duplicate prizes in case of ties. No matter where you live, if you want to win $2,500 first prize money, **send answer today** for details. Can you find 5 or more faces? **Send no money. Alan Grant, Mgr. 427 W. Randolph St., Dept. 234, Chicago.**

LEARN WATCHMAKING AT HOME

You can learn by our modern and original system of instruction every part of the **Watch Repairing Trade** at home as good or better than at a shop. You can earn money while learning and secure a well paying position or start in business after completing our course of instruction. Good watch repairers are always in demand and earn from $50 to $75 per week. For particulars apply to the **Milwaukee School of Watch Repairing, 524 E. Mason Street, Milwaukee, Wisconsin.**

Rider Agents Wanted

Select from **44 Styles,** colors and sizes of **Mead** Bicycles. Ride and exhibit sample RANGER and make money.

Factory to Rider: We ship on approval for **30 Days' Free Trial,** direct from **FACTORY.** Get our marvelous offers. **Easy Payments. $5** down.

Tires lamps, horns, wheels, parts, equipment, and repairs at half usual price. **Established 36 years.**

Mead CYCLE COMPANY DEPT. T-[illegible] CHICAGO

Write us today for free catalog

BE A Traffic Manager

Big Pay—Big Opportunity

Big business needs trained traffic men and pays them well. Train in your spare time for this highly profitable, growing profession. Low cost; easy terms.

Write now for valuable, interesting 64-page book—FREE.

LASALLE EXTENSION UNIVERSITY
Dept. 4493-T, Chicago

The Ridin' DOUGHBOYS from Montana

A Thrilling Novelet of Rough Riding Cowboys on the Western War Front!

by ARTHUR GUY EMPEY

The Month's BEST Westerns

Forbidden Ranch by Howard E. Morgan; My Experiences as a Rustler by Will James; Boss of Hell's Gulch by Geo. C. Henderson; Outlawed by Hapsburg Liebe; and other great yarns.

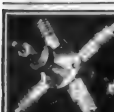
Now on Sale!

TRIPLE-X WESTERN MAGAZINE

Up To $50 A DAY With Tiny "PHONE "MIKE"

Agents are cleaning up everywhere with a phone attachment that looks like a radio mike. Absolutely controls all sounds in your phone—ends the roar that keeps you from hearing clearly; makes it easy to hear even if your phone is in the noisiest factory. Yet also assures privacy — talk exclusively with people within fifty feet of you!

Write and find out how agents report earnings up to $50 a day and even more with this tiny mechanical mystery. Big quantity orders from stores, offices, etc., amazing sales plan doubles calls and sales. Write for FREE introductory offer and amazing Sales Guarantee.
Standard Appliances, Inc., Dept. D-110, 21 W. Elm St., Chicago, Ill.



COMPRESSED AIR MODEL MOTORS

1500 R.P.M., 1/12 H.P., weight 2 oz., 3/16 inch shaft, ⅛ inch B by ⅜ inch S. $7.50 ready to run. The most powerful motor per ounce weight made. Will fly 4-ft. to 6-ft. scale models. Also 6 and 8 cylinder motors and tanks, scale models, etc. Catalogue Free.
MINIATURE AIRCRAFT CORP., 43 Law Terrace, New Brighton, N. Y.

DRAFTING

BOOKS SENT FREE! ON APPROVAL

5 VOLUMES—NEW 1931 EDITION

Only 15 minutes a day with these WONDER BOOKS will prepare you for a good drafting job in less than a year. Mechanical and architectural drafting from simple straight lines to important complex plans. *A step at a time!* Built especially for beginners, for men with only grammar schooling. Drafting room practice. PLUS ENGINEERING, made easy and clear. **Includes complete course in blue-print reading.**

Big Field Big Demand Big Pay

Competent draftsmen are urgently needed right now in all building and manufacturing lines at $50.00 to $100.00 a week. That's just the beginning—FOR DRAFTSMEN HAVE THE BEST CHANCES FOR ADVANCEMENT. Pleasant, fascinating work, easy to learn at home. Especially with these books —send coupon for a set FREE and see for yourself.

A year's consulting membership in the American Technical Society now goes free with purchase of this famous cyclopedia of drafting. Mighty low price it is worth more than the cost of the books.

SEND NO MONEY

Don't send a cent on this great offer. Your name and address, with that of your employer or other reference, will bring them to you absolutely free for examination. Test them, read them, find out anything you want to know and then if you are not more than pleased send them back and you will not owe us one cent. If you decide to keep them, then pay only $3.00 a month until the special introductory price of only $19.80 is paid.

AMERICAN TECHNICAL SOCIETY
Dept. D-4320, Drexel at 58th St., Chicago, Ill.

American Technical Society, Dept. D-4320, Drexel at 58th St., Chicago, Ill.
Send for 10 days' free use New 5 volume set of drafting. I will pay the few cents delivery charges. If I wish, I may return books in 10 days and owe you nothing but if I decide to keep them I will send $2.00 after 10 days, then only $3.00 a month until $19.80, the special introductory price, is paid. Send 1931 edition.

Name.....
Address.....
Employer or Reference.....
Address.....

How to Build "Gannet"

(Continued from page 198)

forward and a pair of closed chocks aft. A couple of 6" cleats are on the after deck. Hooks for fender lanyards are on the house, two or three of them on each side. A jackstaff forward and an ensign staff aft allow you to display your colors properly. The anchor, 35 pounds, stows on deck forward and has at least 120 feet of ¾" diameter manila cable.

The rudder is an important item. It is made of oak with two or three ⅜" or 5/16" edge bolts to stiffen it. An oak or hickory tiller fits between the cheeks at the top. To the forward end of the tiller are attached the tiller ropes, flexible wire or wire covered with rope. The starboard lead goes to a block on the quarter and then across the deck to one sheave of a double block on the port side. The port lead goes to the other sheave of this block. Then both are led forward to another double block abreast of the wheel and through it to the drum of the wheel.

Put corrugated rubber on the steps of the sideladder.

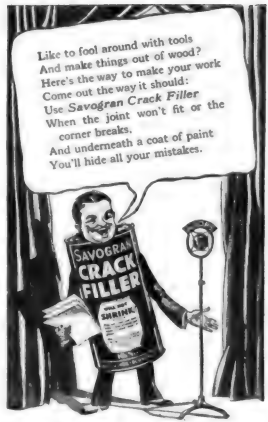
The steering wheel is a galvanized one (brass if you like "spit and polish" or wood if you feel seagoin'). It is mounted on the after bulkhead of the house, either on a block about 8" square or with a block on the other side of the bulkhead to stiffen it. Have the top of the wheel go to starboard when the tiller goes to port. There will be a little slack in the lines when the wheel is hard over, but, if you limit the swing of the rudder to about 35°—the most efficient angle—the slack should not trouble you.

Fit all the equipment that your Uncle Sam requires, bell, horn, whistle, Pilot Rules, life preservers, official number, and so on. The life preservers may be stowed under the cockpit seat if you don't mind taking them out when anybody wants to make up a bed in the cockpit. Another place for them is close up under the awning. It is a good stunt to have a life ring hung in stops, so that it may

be tossed over instantly, on rail or house each side, within reach of the man at the wheel. A folding table for cockpit or cabin will be useful. For any real navigating you will need a good liquid compass and a chart frame to hold a chart in front of the helmsman. This is easily made. A little box for a pair of binoculars is another handy gadget to have. A side ladder and swimming ladder should also be part of the boat's outfit. Have also a boathook and a sounding pole, hand lead and line, fenders and mooring lines.

Painting should be done only in good weather and when things are dry. Use marine paint, not the ordinary house paint, and prepare the surface well. Plane, scrape and sandpaper until it is smooth, then apply the paint. Use the best spar varnish on the mahogany, giving each coat plenty of time to dry before putting on the next. Give the inside, below the cabin floor and under the cockpit and aft, two coats of red lead, freshly mixed. Give the inside of the cabin three coats at least of white lead paint and the outside above the painted waterline three or more coats. Varnish the mahogany, two coats, and give the bottom below the waterline two coats of good copper paint, the first coat preferably on the bare wood. Cabin top may be buff or green (not too dark). Indeed, you can experiment with different color schemes such as white topsides with buff cabin top, (the conventional one) light gray hull and pale green deck, or even try a light olive green or a pale slaty blue for the outside. But have sides, bottom, decks and varnished work harmonize. You don't have to stick to the conventional white and buff. Just the same, don't be too daring in your choice of color. You're going to use *Gannet* for quite a while and you'll soon tire of freakish combinations.

When you put *Gannet* overboard, let her swell up, for a day or two. She may leak quite a lot when she first goes into the water for she will be all dried out and her seams may gape because her planking has shrunk. A day or two afloat will let the planks swell up again and ought to make her tight. If she still leaks, better haul her out again and look for the trouble. After she has been afloat for a while her swelling will squeeze some of the putty out of the seams so that there is a ridge along each. This can be smoothed off easily and she should then retain a nice smooth surface.



HOWDY, folks! Station WOOPS sounding off over the National Crackwork. Here's good news for handy men, "Mr. Fixits," model makers, and toy builders. Yessir! Don't get discouraged when you make mistakes. Just mix up a little Savogran Crack Filler, press into place, smooth off, and go on with the job. When you paint it nobody can detect the repair, because Savogran Crack Filler *will not shrink*—and it doesn't ring or show through the paint. It stays put. Works like wood—can be sawed, cut, smoothed—holds nails and screws firmly. Sure is easy to use—hard to get along without after you once use it. And it comes in mighty handy for fixing loose castors, mending furniture, and hundreds of other repair jobs.

SEND FOR FREE BOOKLET!

Get a big 1-lb. can today at your hardware or paint store —only 30c. Bigger sizes if you want them (5-lb. can, $1.25; 35-lb. pressed-steel pail, $7.70). Ask also for Painters' Savogran—saves hard work on painting jobs and heavy cleaning. And write for the popular free booklet, "How to Repair and Refinish Furniture." It's mighty helpful.

SAVOGRAN CO., DEPT. HH-4, INDIA WHARF, BOSTON

SAVOGRAN
CRACK FILLER
Reg. U. S. Pat. Off.
Patent 1783033

WILL NOT SHRINK!

BASHFUL?

"Blame on you!" Are you nervous, *embarrassed* in company of the other sex? Stop being shy of strangers. Conquer the terrible *fear* of your superiors. **Be cheerful and confident of your future.** Your faults *easily* overcome as you can enjoy life to the fullest. **Send 25c for for this amazing book.**

RICHARD BLACKSTONE, B-334 Fisiron Bldg., N. Y. C.

Making $10,000 a year — *by Scientific Salesmanship*

Are you still wondering whether you'll ever be making $10,000 a year?

Stop wondering! Give yourself a chance!

You know that the big money in business is in selling.

You know, too, if you stop to think about it, that the man who succeeds is not the so-called "born salesman" but the *trained* salesman.

Let us show you, without obligation, how hundreds of men have quickly increased their income all the way from 10 percent to 500 percent—as a direct result of LaSalle spare time training in Modern Salesmanship.

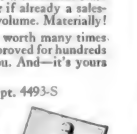
Some were already salesmen. Others had never sold goods in their lives. They were coached by some of the ablest sales directors in America—were shown just how the big sales-producers operate. They were trained at home—scientifically—without loss of either time or pay.

Our 64-page book, "The Modern Salesman", will show you how to make a successful start in this fascinating field—or if already a salesman how to increase your volume. Materially!

This book may easily be worth many times its weight in gold. It has so proved for hundreds of men we can name to you. And—it's yours for the asking.

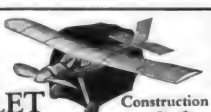
Write today. Address Dept. 4493-S

Ask for "The Modern Salesman." It's FREE



LaSALLE EXTENSION UNIVERSITY
Chicago, Ill.

Boys Fly the IDEAL EAGLET



Construction Outfit **50c** Postpaid

A Perfect Model of a Commercial Plane. All balsawood (not cardboard) with many features of expensive models. Easy, quick, construction; everything ready to put together; weighs 1 oz. complete. Flies like a big one! Get one now and have some real fun!

Send 5c for 48 page Catalog Containing Reduced Prices and Complete Descriptions of Models, Parts, Supplies

Ideal Aeroplane & Supply Company, Inc.
26-28 West 19th Street, New York City

I Get 3 Miles for a Cent in My Car

(Continued from page 54)

derstand that we are splitting drops. At 40 miles an hour on the open road the charge injected into each cylinder may be a part of a drop about the size of a pin head.

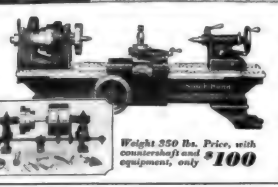
In our engine we have a pump piston actuated by a cam with as many faces as there are cylinders, and a fixed disc containing the same number of outlet holes connected to the cylinders. Below the fixed disc there is a rotating disc so chambered that as it revolves it establishes a connection with the fuel feed line, allows the plunger to draw in a charge, turns to complete a connection to the outlet hole in the fixed disc, through which the rising plunger injects the charge into the fuel line to that cylinder. On each revolution that operation is completed for each cylinder. The length of the piston stroke is varied by the throttle, cutting down or increasing the fuel charge.

When the minute fraction of a drop of fuel enters the cylinder head it passes into a warming chamber where it is heated to a temperature of 180 degrees. During that heating period the piston is drawing in a charge of pure air through the inlet valve and compressing it to 500 pounds pressure, the heat of compression raising the air temperature to 1000 degrees. At the same time an injector plunger in the cylinder head is rising, drawing into the nozzle chamber a previously metered charge of fuel. At 25 degrees before the shaft reaches dead centre for that particular piston, the cam operating the injector plunger forces it downward and expels the the fuel charge, partially vaporized by the hot compressed air, downward through the nozzles into the cylinder, where it immediately ignites and begins to burn the oxygen in the air charge.

There is an immense amount of engineering yet to do. The knowledge of Diesel builders must be combined with the knowledge of gasoline car engineers, and the Diesel re-engineered to bring it down in weight and prepare it for quantity production on a vast scale. A medium-sized Diesel today costs about three times as much as a gasoline engine of the same power. Given an assured annual market for 10,000 engines, and it would be possible to turn them out for about 15% more than a gasoline engine would cost. Add that cost to the cost of a gasoline car, and the Diesel would save money at the end of the first year because of its fuel economy.

$7.00 A Month for this 9" x 2' Back-Geared Special Metal Turning

SOUTH BEND PRECISION BENCH LATHE



Weight 350 lbs. Price, with countershaft and equipment, only **$100**

9¼" swing . . . Precision type . . . ¾" hole thru spindle . . . Phosphor bronze bearings . . . Back-geared headstock . . . Set over tail-stock . . . Graduated compound rest . . . Cone pulley steps 1½" wide . . . Bed lengths 2' to 4½' with between center distances, 5" to 36".

The No. 20 9" Special is our regular Quick Change Gear Lathe stripped of all extras not needed in the small shop. Used for manufacturing, machine shop, repairing, automobile servicing, etc. Suitable for all turning jobs in cast iron, steel, brass, aluminum, bronze, wood, fibre, etc. *WRITE NOW* for descriptive circular—also catalog of other sizes up to 24" swing at $2,000.

SOUTH BEND LATHE WORKS
858 East Madison Street South Bend, Indiana, U. S. A.
LATHE BUILDERS FOR 25 YEARS—OVER 50,000 SOUTH BEND LATHES IN USE

Be My Branch Manager

I show you how to get Big Money

Here is your big opportunity! I need more men to complete my organization. Join my staff, get into the big money. It is easy to get started and the business is very fascinating.

My plan and products are nationally known and every garage auto owner, filling station, etc., are users and prospects for more.

Wonderful new electrolyte charges batteries quickly — new way—Eliminates old method entirely. Thousands of testimonials proveits worth. Gallon free to agents. Will you give me a chance to pay you a good income?

John Mickman, 310-K. Rice St., St. Paul, Minn.

Don't Let $1.00 Stand Between You And A Good Head Of Hair

For years I suffered from dandruff and falling hair, until a friend told me an old Canadian method. This treatment will stop falling hair, eradicate dandruff and grow new hair. My baldness has been replaced with luxuriant new hair. Dozens of my friends have had equal results. The method is simple, easy and positive. Send me $1.00 to cover costs and I will mail you this prescription and method of treatment with my positive guarantee that you will be satisfied or I will return your money. A few cents at any drugstore buys the necessary ingredients. You will thank me many times, as my friends have, for telling this method which has succeeded where everything else has failed. $1.00 only, and your hair trouble is solved for the rest of your life.

STED PITT, Dept. 1-D, 153 Court Street, New Haven, Conn.

MAGIC

Amaze and Mystify your friends. Be popular—Learn to entertain. "The Book of 1000 Wonders" tells how. Explains many coin, card, handkerchief tricks, etc., you can do. 100 pages, profusely illustrated. Postpaid, 10 cents.

LYLE DOUGLAS, Station A-4, Dallas, Texas

Flying and Glider Manual Now on Sale.

RAISE CHINCHILLA AND NEW ZEALAND WHITE FUR RABBITS

Make Big Money—We Supply Stock AND CONTRACT FOR ALL YOU RAISE

Paying up to $6.00 each. Large illustrated book, catalog and contract, also copy of Fur Farming Magazine, all for 10 cents. **STAHL'S OUTDOOR ENTERPRISE CO., Box 125A, Holmes Park, Mo.**

BE AN ARTIST

WE CAN TEACH YOU DRAWING in your own home during your spare time. Thirty-five years of successful teaching proves our ability. Artists receive large salaries. **Write today for Art Year Book.**

SCHOOL OF APPLIED ART
Room B BATTLE CREEK, MICH.

PATENTS

BOOKLET FREE HIGHEST REFERENCES
PROMPTNESS ASSURED BEST RESULTS

Send drawing or model.

WATSON E. COLEMAN
724 9th St., N. W. Patent Lawyer Washington, D. C.

Learn Autos in Los Angeles

Come West at Our Expense!

For a limited time we are making a railroad fare offer from any point in the United States to Los Angeles. Just think of it! A Trip to California with travelling expenses allowed!

Spend a Few Short Weeks Learning Autos!

Quickly train for Big Pay Jobs in the Auto Game. Unlimited Lifetime Employment Service. Employers insist on our men instead of green, half-baked mechanics who don't know what it's all about. That's why you don't find National Trained Men walking the streets for jobs.

Don't Worry About Money! We'll Help You!

If you are low on cash, we'll help you. We GUARANTEE to give you a part time job to cover living expenses while learning.

It's Easy at National!

Short, condensed training in our Million Dollar Practical "School of Shops"...instruction on the most modern equipment money can buy...with the country's best staff of expert, experienced master mechanic instructors. No dry lectures or text books. Straight practical work on real jobs. No previous experience needed. None too old or too young to learn. Start any time.

WRITE TODAY! We'll send you the full story about Railroad Fare Offer, Unlimited Employment Service, New Book sent FREE.

FREE BOOK

NATIONAL AUTOMOTIVE SCHOOL
Dept. 43-A 4006 So. Figueroa St., Los Angeles, California

PUT YOURSELF OVER . . . . in a BIG WAY

LEARN to play a Buescher, for social popularity, big pay; success. Live on the cream of life. Any Buescher quickly, easily mastered. Lessons *given free*, on request, with instrument. Join a band or orchestra in 90 days. Ask your local Buescher Dealer for any Buescher Instrument on *six days' free trial.* Take it home. See what you can do. Or write direct for beautiful catalog. Mention favorite instrument. *Send postal today.*

BUESCHER BAND INSTRUMENT CO.
415 BUESCHER BLOCK Elkhart, ELKHART, INDIANA

Be a DENTICIAN
LEARN AT HOME

To make Crowns, Plates, Bridgework, etc., for Dentists. Easy practical way to learn mechanical dentistry at home in spare time. Full equipment of tools and materials included with course FREE. Low tuition. Easy terms. Write for FREE BOOK about this money making profession and our easy to-learn home study course and special offer.

McCarrie School of Mechanical Dentistry
3340 S. Michigan Avenue Dept. c. 448 Chicago, Ill.

Electricity
Learn in Los Angeles

NATIONAL Opens Its Doors to You!

Right in the heart of America's most interesting place to live and learn ..National the approved trade school of the West *invites you to Los Angeles!* Come West, enjoy life; learn a profitable trade in a land of prosperity, progress, sunshine and happiness. REAL *Big Pay Jobs* waiting for you as soon as you are trained Unlimited Employment service

Your Railroad Fare Allowed for a Limited Time!

Every one dreams of coming to California. National will pay your railroad fare from any point in the United States. Never again another opportunity like *this!* Investigate this great offer at once!

Don't Worry About Enough Money! We'll Help You!

If you are short of money, we guarantee you part time jobs to earn your living expenses while learning.

Write Today About the Greatest Offer Ever Made!

This great Million Dollar Institution is equipped with the best money can buy...the finest faculty of electrical experts in the country opens its doors to you. No age limit...no previous experience required, start any time. Send at once for NEW Book with full details!

FREE BOOK

NATIONAL ELECTRICAL SCHOOL
Dept. 43-E 4006 So. Figueroa St., Los Angeles, California

Next—100 Story Buildings

(Continued from page 83)

and a heavily loaded one is heavier, and so each tries to run faster than the governor speed, the empty one when going up and the loaded one when coming down. When that happens the driving motor becomes a generator, and actually puts current back into the line, while the enormous resistance of the field acts as a brake and maintains an even speed, just as regeneration is used to brake heavy trains on the electrified mountain divisions of the Milwaukee Road. where air brakes are never necessary to keep the train speed constant while going down hill.

Modern elevators are provided with so many safety features that accidents are virtually impossible. A single cable is sufficient to support the load, yet six are commonly used, not so much for safety as to give more traction on the hoisting drum. A ball governor fixes the limiting speed, and in event of accident would trip a clutch, releasing dogs and shoes which would press against the guide rails and bring the car to a stop. In the pit at the bottom of the shaft an oil piston buffer provides additional safety, and the counterbalance also is fitted with a buffer. The stops at the ends, or terminals of the elevator "line" are operated by curved cam rails attached to the guides. The cams move a lever which trips the switches and brings the car to a stop. That's just added insurance against failure of the selector, and then to guard against failure of the cam lever there's a final limiting switch which cuts out all current and stops everything.

It's a long step from the first crude elevator built by Henry Waterman in New York in 1850 to such super-human machines. That first elevator was simply a platform hoist, built to operate between two floors. The first passenger elevator ever installed was built by Elisha Graves Otis, of Yonkers, N. Y., in 1852, and in 1854 he invented the first elevator safety device, designed to prevent the car falling if the hoisting rope should break. Otis Tufts, of Boston, invented the "vertical railway" in 1859, a platform raised and lowered by a huge screw, but only two were ever built. The Otis organization invented an oscillating cylinder steam engine and a stationary cylinder engine, both of which were in general use for elevators until the hydraulic type was introduced in the seventies.

LEARN AVIATION AT LINCOLN . . .
Where "LINDY" Learned

Lindbergh tells about his training days at Lincoln in his book "WE". You, too, learn Aviation at Lincoln!

DO *YOU* EARN $550 PER MONTH?

Aviation pays Big Money! Offers unlimited opportunity! *Air mail and transport pilots received an average salary of $550 per month during the past year.* Mechanics also get good pay.

Get Into Aviation as Pilot or Mechanic

Splendid openings for properly-trained pilots and mechanics. Our Flying Courses qualify you for best pay pilots' positions. Our Mechanics' Course qualifies you for position at airport or factory. Mechanics' School is tied in with large modern aircraft factory . . . . we teach you by factory standards. 20 years' experience.

This Lincoln School is one of the finest equipped in America. *Ground and Flying School are government-approved.* More than $250,000 worth of buildings and equipment. $100,000 airport. Large fleet of modern planes. Competent, government-licensed instructors. *Tuition very reasonable.*

Special Courses in Radio now an important feature of Lincoln training. We prepare you for a position as Radio Mechanic.

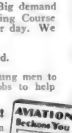
Special Welders' Course . . . Big demand for properly-trained welders. Our Welding Course graduates earn as much as $12 to $18 per day. We train you for a good job in a short time.

Also Home Study Course offered.

PART TIME JOBS . . . to assist young men to get into Aviation, we offer part time jobs to help pay living expenses while in training.

WRITE FOR FREE CATALOG!

Get FREE Lincoln School Catalog, reasonable tuition rates, part time employment offer, etc. Catalog contains complete information about Mechanics', Pilots', Radio and Welding Courses. Write, stating age, today!



LINCOLN AIRPLANE & FLYING SCHOOL
404 AIRCRAFT BUILDING LINCOLN, NEBRASKA

HERCULES STEAM ENGINE GIVEN

A Wonderful Offer

Here's a wonderful offer. "Little Hercules" special steam engine. Made by "Weeden," world's leading maker. This engine is of fine quality and highly finished in bright colors. Has heavy fly wheel, smooth-running piston and heavy cylinder. Strong boiler and fittings. Large fuel box. Pulley wheel that will run mechanical toys like Erector, Meccano, etc. Runs on alcohol or canned heat. A big, POWERFUL, high-quality steam engine. Just what you've been waiting for—and you can have it FREE! Read special offer.

SENSATIONAL STORIES

The Open Road for Boys is a 50-page boys' magazine just crammed brimful of thrills. The kind of blood stirring stories you've been looking for. Tales of high adventure on land and sea. Air stories that taste your breath away, of war pilots in deathly combat above the clouds, of mail pilot heroes. Sport stories, school stories, tales of distant jungle lands, etc. No other magazine has stories like these. Best joke page published. World-wide correspondence club, friends in foreign lands, stamps, boy mechanic, tells you how to make all the things you want. OPEN ROAD PIONEER CLUB; best done on hunting, fishing, camping. Contests galore with prizes for all. Extra money. One whole of a magazine say 200,000 readers. Red blooded stories for red blooded he boys. Read special offer.

Special Offer To make new friends we will send you the magazine for a whole year, twelve fat issues for $1—and send you this wonderful steam engine FREE. This is a great offer. Act quickly. Regular subscription price to Open Road for Boys is $1 a year (half of others).

ASK DAD NOW

Don't wait! Get your steam plans and have your fun *right away.* Ask Dad. He'll tell you Weeden means top quality and he'll tell you what a grand offer this is. Send coupon today. Back comes your steam engine and your first thrilling issue of Open Road for Boys Magazine. Satisfaction guaranteed or money back

USE COUPON

Open Road for Boys Magazine—Dept. 33
150 Newbury Street, Boston, Mass.

Friends: Here's my dollar ($1). You bet I want to grab this offer! Rush my steam engine to me and put me down for a year for the OPEN ROAD for BOYS.

Name .....

Street .....

Town or City ..... State .....

Canadian Postage 25c extra. Foreign 50c extra.

GET YOURS RIGHT AWAY

Play the Hawaiian Guitar like the Hawaiians!

Only 4 Motions used in playing this fascinating instrument. Our native Hawaiian instructors teach you to master them quickly. Pictures show how. Everything explained clearly.

Play in Half Hour
After you get the four easy motions you play harmonious chords with very little practice. No previous musical knowledge needed.

Easy Lessons
Even if you don't know one note from another, the 52 printed lessons and clear pictures make it easy to learn quickly. Pay as you play.

GIVEN *when you enroll* **—a sweet toned HAWAIIAN GUITAR, Carrying Case and Playing Outfit—Value $18 to $20**
No extras—everything included

WRITE AT ONCE for attractive offer and easy terms. You have everything to gain. A postcard will do. **ACT!**

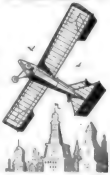
TENOR BANJO and other courses. The same thorough instruction on Tenor Banjo, Violin, Tiple, Tenor Guitar, Ukulele, Banjo Ukulele. Well-known instructors. Write for full information.

FIRST HAWAIIAN CONSERVATORY of MUSIC, Inc.
9th Floor, Woolworth Bldg. Dept. 666. New York, N. Y.
Approved as a Correspondence School Under the Laws of the State of New York Member National Home Study Council

LOOK BUILD THIS GIANT

The only model plane with Automatic Pilot

The patented **pilot automatically** rights it in air currents working tail, ailerons and rudder all by itself in full flight. No wonder it **rises higher** (500 feet or more) and **flies more miles** than any other. It also has a Parachute Drop! Sporty, thrilling, durable beautiful, big! 7-ft. wing spread! Life size plans make it so easy to put together quickly. Complete details and specifications and beautiful color print to frame on your wall for only 10 cents. Write



ELTON-McCARDLE CO.
Dept. MC-4
366 Seventh Ave. New York

WELDING ELECTRIC ARC OXY-ACETYLENE

TAUGHT BY ACTUAL WELDING PRACTICE
No finer equipment anywhere at any price. Learn Pipe-Line, Sheet Steel, Structural Steel, Cast Iron, Aircraft and Commercial Welding, Cutting and Brazing.
Enroll now and train for steady work at big pay.
Also Courses in Radio, Electricity and Automobiles.
FULL INFORMATION FREE ON REQUEST
Coleman Electrical School 1672 Main St. Kansas City, Mo.

Believe It or Not!

(Continued from page 72)

You should have seen the way he tossed me around on a wrestling mat.

They tell me that I am the most imitated artist in the world since I have created what is known as the "black and white" style of drawing. Since we're in the believe-it-or-not mood, my drawings bring me a gross of $1,000,000 yearly. I have a score of secretaries and a research bureau to keep grinding out the ideas for my cartoons.

I do all my work in my home in the New York Athletic Club, which indicates that I must be some kind of an athlete. I once busted my arm trying to make Mr. John J. McGraw's pitching battery. Another time I socked Jack Dempsey in the jaw, believe it or not, it was in fun. I'm nuts about handball. In 1926 I was so goofy over it I won the New York handball championship.

MAKE $25.- A DAY

MYSTERY GAS LIGHTER
NO FLAME OR SPARKS
LIGHTS GAS INSTANTLY
SELLS LIKE WILD FIRE
RUSH $9.00 FOR GROSS or $1.00 FOR DOZ. SAMPLE FREE RETAILS FOR 25¢
GOOD FOR 10,000 LIGHTS

SQUARE DEAL MFG. CO., Box MM-3, BRADFORD, PA.

PATENTS

Trade Marks, Copyrights, Patent Litigation Handbook with illustrations, 100 mechanical movements. Sent free on request.

ALBERT E. DIETERICH
formerly member examining corps U. S. Patent Office
PATENT LAWYER and SOLICITOR
261-A, OURAY BLDG.
30 Years' Experience Washington, D. C.

WIN $3,700.00!

Twenty-eight people, from a boy of 15 to elderly men and women, recently solved our puzzles and won a place in our Good Will Fund Prize Distribution. They won $34,210.00. Now we offer dozens of new bigger prizes. Here's the qualifying test for this new opportunity.

FIND THE TWINS Below are seven pictures of Clara Bow, the great Paramount Movie Star. Study them carefully. At first they all look alike—but do not make a mistake. Some have fancy combs or roses in their hair. Some have black shoulder straps, others do not. Somewhere among these pictures are two and only two exactly alike—IDENTICAL TWINS. If you can find them, rush the numbers of the twins to me for submission to the puzzle judges.

ADDITIONAL $850.00 FOR PROMPTNESS If your answer is correct, you will be eligible for this new prize distribution and may win the highest prize—a big new airplane (and complete flying instruction) or $2,850.00 cash, with **$850.00 extra for promptness**, making the total $3,700.00 all cash. Many other prizes paid at same time. Duplicate prizes awarded in case of ties. Cash reward for all taking active part. No prize less than $10.00. No more puzzles. No obligation. Perhaps you may be the winner of **highest** prize! Send no money, but hurry.

M. J. MATHER, Advertising Manager, Room 319, 54 W. Illinois St., Chicago, Ill.

Don't Miss This Gripping Fact Story

How I Stole Clara Phillips from Jail

One of the most amazing human documents ever written.

In the April

STARTLING Detective ADVENTURES

ALSO

SOLVING BROOKLYN'S INFAMOUS TORSO MURDER

SEATTLE'S HOUSE OF HORROR

THE LOWDOWN ON AL CAPONE

and many other fascinating TRUE features from the Police Records.

On Sale March 10

If your newsdealer is sold out send 25 cents (stamps or coin) to Startling Detective Adventures Magazine, Sexton Bldg., Minneapolis, Minn., and a copy will be mailed to you.

"FISHING WHAT TACKLE AND WHEN"

FREE

Foremost writers on fishing have helped compile this book. Invaluable to beginners. Interesting to old timers. Thousands have improved their knowledge and methods of bait and fly-casting by studying it. 1931 edition contains new ideas, new pictures, new articles on fishing. Shows variety South Bend tackle. Mailed with our compliments, *free!*

NEW 84-PAGE BOOK ON FISHING

SOUTH BEND BAIT CO.
534 High St., South Bend, Ind.

SOUTH BEND

Fishing Tackle of all kinds — Rods Reels Lines Baits

Mysterious Moonlight Ring

Changes Nickels into Dollar Bills

Not a "luck charm"—yet it has brought good fortune to hundreds . . . Not a wishing ring—yet it may bring what you most desire . . . You give it away FREE—yet you make up to $14 A DAY STEADY INCOME

No "trickery," no "sleight of hand" no "short changing," yet you actually do change Buffalo Nickels into Dollar Bills with this mysterious, scientific discovery under the most daring money-making plan ever given to American men and women.

MEN and WOMEN— MAKE UP TO

$14 a DAY

Business men and financiers said it couldn't be done until they saw how it worked—**entirely within the law.** Now, in one of the greatest "gold-scattering" offers in all your experience, you can see for yourself. Try its startling money-making powers WITHOUT RISK. If it fails to bring you money we will pay you cash for your time! Try it by simply giving away

FREE RINGS

Rush coupon for Sample offer—get in on the "ground floor" of a proposition that may mean the beginning of financial independence. Act Quick—send no money. Just send coupon to Illidela Corp., 311 N. Des Plaines St., Dept. 184, Chicago, Ill.

ILLIDELA CORPORATION,
311 N. Des Plaines St., Dept. 184, Chicago, Ill.

Without cost or obligation to me rush your generous Sample Offer. Show me how the "Moonlight Ring" has power to bring me up to $14 a day.

Name .....

Address .....

City ..... State .....

WORLD-WIDE SHORT WAVE RECEIVER

ONLY $6.45

Span the World with this Set!

A new radio thrill for you! Listen in DIRECT to London, Paris, Berlin, Buenos Aires and other broadcasting stations throughout the world via short waves. Enjoy unique foreign programs from strange lands. Your ordinary receiver cannot tune in these low wave stations. WORLD-WIDE RECEIVER gets 14 to 550 meter stations with surprising clarity. **SEND NO MONEY!** Just write your name and address on a postcard and ask us to send you this wonderful guaranteed short wave set. Pay postman $6.45 plus a small delivery charge. All orders west of Rockies must be accompanied by $1.00 deposit. Foreign countries $2.00 extra, postpaid. Write today for our parts catalog.

OTHER RADIO BARGAINS

Low Power Transmitter adaptable for phone or code. With plug-in coils..... $14.75

Auto Radio—Uses 3—224 and 3—227 tubes, single dial, tremendous volume. Compact. Fits any car..... 29.80

B Eliminator, Bone Dry with 280 tube, 180 volts, will operate up to ten tube sets, fully guaranteed..... 6.75

AC—A B C power packs..... 9.75

Tubes: UX type, 90-day replacement guarantee. No. 210, $2.25; No. 250, $2.35; No. 281, $1.85; No. 245, $3.25; No. 224, $1.25; No. 227, 75c; No. 226, 65c; No. 171, 75c.

Write for Bargain Catalog

CHAS. HOODWIN CO.

4249 Lincoln Ave., Dept. D-7 CHICAGO

NEW SCIENTIFIC WONDER

"X-RAY" CURIO

10c 3 for 25c

"Silver Only"

BOYS BIG FUN. You apparently see thru Clothes, Wood, Stone, any object. See Bones in Flesh. FREE PRO. radio picture films, take pictures without camera. "You'll like 'em." 1 pkg. with each 25c order.

MARVEL MFG. CO., Dept. 88. NEW HAVEN, CONN.

"Been on a vacation Bill?"

"No, Jim—I've stopped smoking. Gained six pounds in a week. You know how I used to smoke—a package of cigarettes and a cigar or two a day—it sure had some hold on me. I tried to stop many times but could only quit for a few days. But I'm through forever now—took a scientific home tobacco treatment—fixed me up in two weeks.

"I wasn't hard on me at all—noticed improvement the first day—I feel like a new man. It didn't interfere with my work—didn't leave any druggish after-effects—the money I saved in the last two weeks has paid for the treatment alone.

"Why don't you take it? It has entirely banished the tobacco habit for many thousands of men like you and me. It has been successfully used for over fifty years and comes to you with a money-back guarantee—it is a doctor's individual prescription that sure fixes you up. Write for full information NOW. No obligation. All correspondence is strictly confidential."

NAME
ADDRESS
CITY
STATE

The Keeley Institute, Dept. D-729 Dwight, Ill.

Home of the famous "Keeley Treatment for Liquor and Drugs." Booklet sent on request. Correspondence Strictly Confidential.

In Winter Quarters With the Circus

(Continued from page 104)

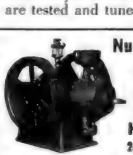
He made a fresh start the following year, but at the end of the season sold out his name and leased his winter-quarters to the American Circus Corporation. When he died five years later, his widow sold the big place to the leasors.

Less than three years ago, John Ringling, of Ringling Brothers fame, acquired all the interests of the American Circus Corporation and with one master stroke, became owner of just about every circus of size in America save for old 101 Ranch, owned by the Miller Brothers and which hasn't toured for a season or two. Reputed and recognized by bankers as the fifth richest man in the world, Ringling is a name to bow to in amusement circles. Yet the public scarcely know of him.

Thousands of people flock to Peru during the winter months to see the animals trained and study the processes involved in getting the big shows ready for the road. When the weather is mild the training is done in outside arenas—when snow flies and zero weather prevails, the spectators crowd the steam-heated inside ones and breathlessly watch men pit their courage and intelligence against brute cunning and savageness.

Training must be kept up during the winter months for obvious reasons. Animals soon forget and there must be no let-down in their contacts with the men who train them. This is especially true of the cat tribe.

When the eaves begin to drip in the early spring, the acrobats, clowns and special acts arrive for preliminary workouts and trial rehearsals. Headquarters speeds up then and begins to synchronize apparent disorder into clock-like harmony. The topmen, roustabouts, musicians, ticket-takers, barkers, freaks and ballyhoo men appear like magic—back from their own peculiar holidays. The ready trains are shunted in from the railroad yards and loaded up—the calliopes are tested and tuned (if ever) and made fit.



Nu-Way Gasoline Engines

Model Steam Engines & Boilers, Castings, Blue Prints, Water Motors. Sell your old Engine, Motor or Lathe. Write us your wants. What have you? Catalog 15-A, sent postpaid 10c.

Howard Engine & Mfg. Co.

2417 N. Ashland Ave. Chicago, Ill.

Building a Chevrolet Race Car

(Continued from page 175)

oped for this job, with a patented direct down draft manifold system. The head is made of the finest semi-steel and the valves and spark plugs are water jacketed. In carrying high compression it is absolutely necessary that every part of the head should have an even temperature while running at peak load. No matter how much horsepower may be developed, if the temperature rises in any cylinder head the power immediately falls off.

To protect the spark plugs at high compression a firing hole of small diameter enters the cylinder, while the plug is protected by the head. The first explosion occurs in the small spark plug chamber, from which it travels to every part of the combustion chamber. With this construction it is not necessary to have dual ignition.

Valve timing and carburetion are the two important factors in racing motor construction. By using the 1924 Oldsmobile valve lifters in combination with the 1927 Chevrolet camshaft we get an ideal racing timing. For fuel we recommend Ethyl gasoline, with two gallons of Benzol, which can be obtained from any paint store, added to each five gallons of gas. Straight castor oil, obtained from a drug store, is recommended for lubrication.

If you want any further details about "souping up" a Chevrolet, instruction on how to build the frame or other parts, or information about special parts and process, write the author, in care of the editor.

Learn to Dance

This New Easy Way

You can learn all the modern dances—Charleston, Black Bottom, Valencia, Castor, French Tango, St. Louis Hop, Latest Waltzes, Fox Trots, etc., at home easily and quickly. New chart method makes dancing as simple as A B-C. No music or partner required. Learn anywhere, anytime. Win new popularity. Be in demand at parties. Course complete. Lessons would cost $50 if taken privately.

Send No Money

Just send your name and address. We'll ship the complete course—325 pages, 49 illustrations—without one cent in advance. When package arrives, hand postman only $1.98, plus delivery charges, and this wonderful course is yours. Try for 5 days. Money back if not delighted. Send your name NOW.

FRANKLIN PUB. CO. 800 N. Clark St. Dep. A312 Chicago

OUTDOOR JOBS

Get Forest Ranger, Park Ranger or Game Protector job: $140-$200 month; vacation; steady jobs patrol forests and parks; protect game. Qualify now. Write for full details.

Delmar Institute, Dept. B-32, Denver, Colo.

"The Boss Didn't Even Know My Name"

"He said my face was more or less familiar and he remembered seeing me around, but he didn't even know my name until the I. C. S. wrote him that George Jackson had enrolled for a course of home study and was doing fine work.

"Who's George Jackson?' he asked. Then he looked me up. Told me he was glad to see I was ambitious. Said he'd keep his eye on me.

"He did too. Gave me my chance when Frank Jordan was sent out on the road. I was promoted over older men who had been with the firm for years.

"My spare-time studying helped me to get that job and to keep it after I got it. It certainly was a lucky day for me when I signed that I. C. S. coupon."

How much longer are you going to wait before you take the step that will bring you advancement and more money?

It takes only a moment to mark and mail this coupon and send it to the International Correspondence Schools at Scranton, but th t one simple little step may change your entire life. Isn't it better to do this today than to wait a year or five years and then wish you had?

Mail the Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS
"The Universal University"
Box 2325-J, Scranton, Penna.

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject *before* which I have marked X:

TECHNICAL AND INDUSTRIAL COURSES

☐ Architect	☐ Automobile Mechanic
☐ Architectural Draftsman	☐ Plumbing ☐ Steam Fitting
☐ Building Estimating	☐ Heating ☐ Ventilation
☐ Wood Millworking	☐ Sheet Metal Worker
☐ Contractor and Builder	☐ Steam Engineer
☐ Structural Draftsman	☐ Steam Electric Engineer
☐ Structural Engineer	☐ Civil Engineer
☐ Electric Wiring	☐ Surveying and Mapping
☐ Electrical Engineer	☐ Refrigeration
☐ Electric Lighting	☐ R. R. Locomotives
☐ Welding, Electric and Gas	☐ R. R. Section Foreman
☐ Reading Shop Blueprints	☐ R. R. Bridge and Building Foreman
☐ Telegraph Engineer	☐ Air Brakes ☐ Train Operation
☐ Telephone Work	☐ Highway Engineering
☐ Mechanical Engineer	☐ Chemistry ☐ Pharmacy
☐ Mechanical Draftsman	☐ Coal Mining Engineer
☐ Machinist ☐ Toolmaker	☐ Navigation ☐ Boilermaker
☐ Patternmaker	☐ Textile Overseer or Supt.
☐ Pipefitter ☐ Tinsmith	☐ Cotton Manufacturing
☐ Bridge Engineer	☐ Woolen Manufacturing
☐ Bridge and Building Foreman	☐ Agriculture ☐ Fruit Growing
☐ Gas Engines ☐ Diesel Engines	☐ Poultry Farming ☐ Radio
☐ Aviation Engines	☐ Marine Engineer

BUSINESS TRAINING COURSES

☐ Business Management	☐ Business Correspondence
☐ Office Management	☐ Lettering Show Cards ☐ Signs
☐ Industrial Management	☐ Stenography and Typing
☐ Personnel Management	☐ Complete Commercial
☐ Traffic Management	☐ Civil Service ☐ Mail Carrier
☐ Accountancy ☐ Cost Accountant	☐ Railway Mail Clerk
☐ C. P. Accountant	☐ Grade School Subjects
☐ Bookkeeping	☐ High School Subjects
☐ Secretarial Work	☐ College Preparatory
☐ Spanish ☐ French	☐ Illustrating ☐ Cartooning
☐ Salesmanship ☐ Advertising	☐ Lumber Dealer

Name..... Age.....

Address.....

City..... State.....

Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

There are Two Ways to go about getting yourself A BETTER JOB

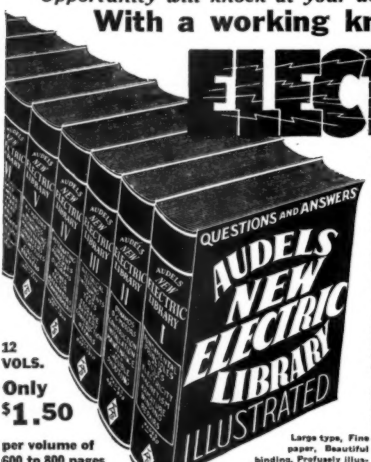
1 Stick to your job. And work. Know theory as well as practice. Study the jobs of the man alongside you, and the man above. Know the *how* and *why*.

2 Decide that you are up against a stone wall. Consider what you do best; what you like to do; whether it pays well; offers a future. Then *get ready*.

Opportunity will knock at your door when you are ready

With a working knowledge of

ELECTRICITY



12 VOLS.

Only $1.50

per volume of 600 to 800 pages

Large type, Fine paper, Beautiful binding, Profusely illustrated—Photos, diagrams, valuable tables.

you can find a job in a field that never will be overcrowded. For Electricity does most of the world's work today; will do more tomorrow. There will always be good jobs for good men in Electricity . . . and at good pay. The work is interesting! You put your heart and soul into it—get somewhere.

AUDELS NEW ELECTRIC LIBRARY makes Electricity as easy as ABC for beginners; interesting as fiction; engineers carry in pocket for spare time reading and reference; questions, answers, diagrams, calculations, underwriter's code; design, construction, operation and maintenance of modern electrical machines and appliances. FULLY COVERED, in twelve (12) handsome, flexible covered volumes. (Nine ready, three in work.)

THESE SUBJECTS—Hundreds of Others

Dynamos, D-C Motors, Armature Winding, Maintenance, Tests, Batteries, Transformers, Condensers, A-C Motors, Alternating Current, Meters, Power Station Practice, Wiring Diagrams, Electric Railways, Elevators, Auto and Aero Ignition, Radio, Telephone, Telegraph, Motion Pictures, Talkies, Refrigeration, X-Ray, Welding, Domestic and Farm Appliances.

QUESTIONS AND ANSWERS

You remember what you read THE AUDEL WAY. Every paragraph is written simply and logically so as to answer the "test questions" at the end of each chapter. This makes facts stick.

AUDELS EASY BOOK-A-MONTH STUDY PLAN

The newest, easiest way to study. Only one book a month to read. Every subject made as simple and clear as ABC. Even poor students find it intensely interesting, are amazed at the ease of it and the speed with which they learn. What you start *the Audel Way* you can finish.

COSTS 6¢ A DAY

The *money* cost—the price of one mild cigar per diem—is nothing. The price in *time* is a few hours per week, spent as enjoyably as in reading fiction.

PLUS NOT TOO MUCH SWEAT

The cost in *effort* is something. No one ever got anywhere without lifting a finger. But—we have been helping men to overcome the handicaps of education for FIFTY YEARS. Let us help you!

MAIL COUPON TODAY

BUT SEND NO MONEY

THEO. AUDEL & CO., 65 W. 23rd St., N. Y. City

Mail Vol. I, Electric Library on 7 days' free trial. If O. K. I will remit $1.50, otherwise return it. I also request you to mail one book each month on same terms. No obligation unless I am satisfied.

Name.....

Address.....

Occupation.....

Employed by..... MM.

Just Give Me HOT SHOT

Amazing Electrical Wizard Starts Cars Without Continual Choking— Saves Gas — Saves Oil — Increases Speed —and Warns *of Motor Trouble.*

HOT SHOT *Sparks* BLUE *if Ignition is O. K.*
—RED *to Denote Electrical Trouble.*

HOT SHOT is one of the most amazing, baffling, and efficient devices ever invented for the gasoline engine. Installed in a few seconds on any car, truck, tractor, motor boat, airplane or stationary engine, without tools. A big, fat BLUE spark says "The motor is O. K." but the minute a plug is shorted or other electrical trouble develops, up jumps a RED spark—and HOT SHOT saves you plenty of grief.

Here's how HOT SHOT works. The "Juice" from your battery passes through the coil, stepping it up to about 7000 volts for the average spark plug. Then—HOT SHOT does its stuff, stepping up the voltage to more than 11,000 volts. Your car responds to this increased voltage with more power, pep and pickup. More of the gasoline vapor is consumed. Crankcase dilution is minimized. More mileage and less carbon. A sweet running motor instead of a sour one.

The Secret of HOT SHOT'S Efficiency

HOT SHOT is made from a special di-electrically tested glass in tubular form. Visible inside this tube are two adjustable firing points of manganese metal—the highest electrical resisting metal known. These points spark continuously with each explosion of each cylinder. A wonderful demonstration—a BLUE spark shows perfect operation—a RED spark warns something is wrong. And — every spark, magnified to more than 11,000 volts, is a miniature streak of lightning to aid combustion and add to power.

LET HOT SHOT PAY YOUR GAS TAX

Yes Sir, HOT SHOT more than pays your gas tax in the saving of gas alone. By eliminating the continual use of the choke, you minimize crank case dilution. Instead of changing oil every 500 miles, you change every 1000 to 1200 miles. No longer is it necessary to run 6 to 8 blocks with your motor spitting and popping and gasoline wasting away. SAVE THAT MONEY with HOT SHOT!

Manufactured by
REARDON MFG. CO.
Dept. V-4 PEORIA, ILL.

Agents Making Big Money

"Shin 14 HOT SHOTS at once"—says Murphy, Foreman wires, "Send Plan Three". West ordered 12—sold them before they were shipped and doubled his order. Caldwell writes "HOT SHOT a wonderful product and fast seller." GUY McCULLOUGH says, "Started Monday and averaged 15 HOT SHOTS a day until Friday night and when I got home found the wife had orders for 61 more HOT SHOTS from the 2 fellows I started out last week."

Bill Reardon, Reardon Mfg. Co.,
Dept. V-4, Peoria, Ill.

Dear Bill: Please send me, without obligation, full details about HOT SHOT. Don't ship anything C.O.D.—just give me your FREE SAMPLE OFFER and special agent's proposition—in your first letter.

NAME .....
ADDRESS .....
CITY ..... STATE .....

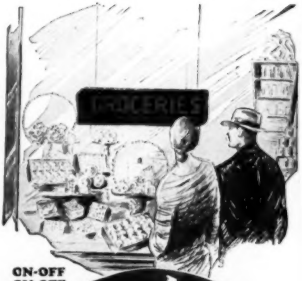
☐ Check here if interested in HOT SHOT only for your own car.

New FLASHER SIGN

Pays Men Up To $30 a Day

Newly Discovered Process Gives Merchants This Famous Sign at One Tenth Price of Others

Everyone has seen them, **the sign of such piercing brilliance** that ordinary electric signs are dull in comparison. Every merchant has wanted to have such a sign but the price has been prohibitive. *Now a miraculous new process duplicates effect of the expensive signs at one-tenth the cost!* Now, for very little more than the cost of an ordinary show-card, stores, restaurants, banks, theatres, barber shops, etc., can attract customers with this famous sign. It not only has unparalleled brilliance but a new added feature makes it F-L-A-S-H—on—off—on—off! No long, hard, messy job to install. The whole unit is completely inclosed in beautiful mahogany finish metal box. Simply plug into electric light socket.



ON-OFF
ON-OFF

No "Selling Talk" necessary— 2 Minute Demonstration Makes Sales

No "selling talk" to memorize—no experience in selling is necessary. A two-minute demonstration gives the whole story and takes 3 orders out of five calls. Walk into a store; set the sign on a show case or in the window; plug into an electric light socket. In half a moment the sign is flashing its message with a brilliance that fairly screams for attention. Show him how the message can be changed quick as a flash.—YOUR SALE IS MADE RIGHT THERE! That's why $30 a day can be made so easily! That's how Tettens of Iowa earned at the rate of $10 an hour his first day, and how others are making such big money.

QUICK! GET SIGN WE LOAN YOU

Merchants in your locality want this sign. Within the next 30 days they will be ordering these signs from some lucky man. Be the one to get from $2.50 up on every order. You risk no money to get started—we loan you complete sign to use in demonstrating. Just take the orders. We deliver and collect. Rush the coupon; get the generous free offer; get money immediately.

Looks Like $100.00 Sells for Only $7.50
YOUR PROFIT $2.50
PLUS LIBERAL CASH BONUS PAID WEEKLY

MAIL Coupon

Williams Name Plate Sign Co.,
30 No. La Salle St., Dept. 6-4, Chicago, Ill.

Rush me details of your free offer and loan of full size, working sample WIL-O-LITE sign without risk to me.

Name .....

Address ..... City ..... State .....

FARNHAM'S, MINNEAPOLIS